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The OIL AND GAS JOURNAL

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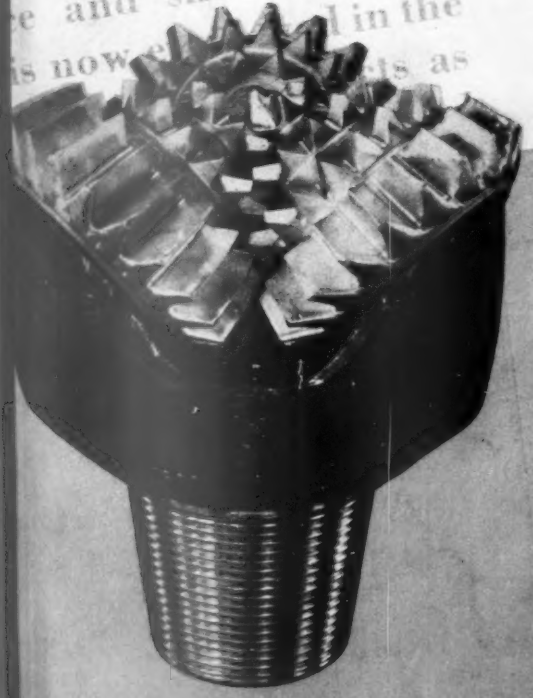

Hughes Tool Company designed and built the Hughes Aircraft Strut Division . . . acted in a consulting capacity in the design and construction of the Dickson Gun Plant . . . furnished the entire executive and operating personnel for both plants . . . which are now in operation . . .

propeller ferrules; armor plate, brake drums, and transmission parts for tanks; castings for synthetic rubber plants; struts, pump parts, rudder arms, rudder bearings, stuffing tubes, and other parts for ships—*these in addition to* ***tools for the essential Oil Well Drilling Industry.***

Rock Bits—Core Bits—Tool Joints . . . are tools without which wells to produce the oil for the war machine could not be drilled. These are WAR products, just as essential as the numerous *other* items we are making for the Army and Navy.

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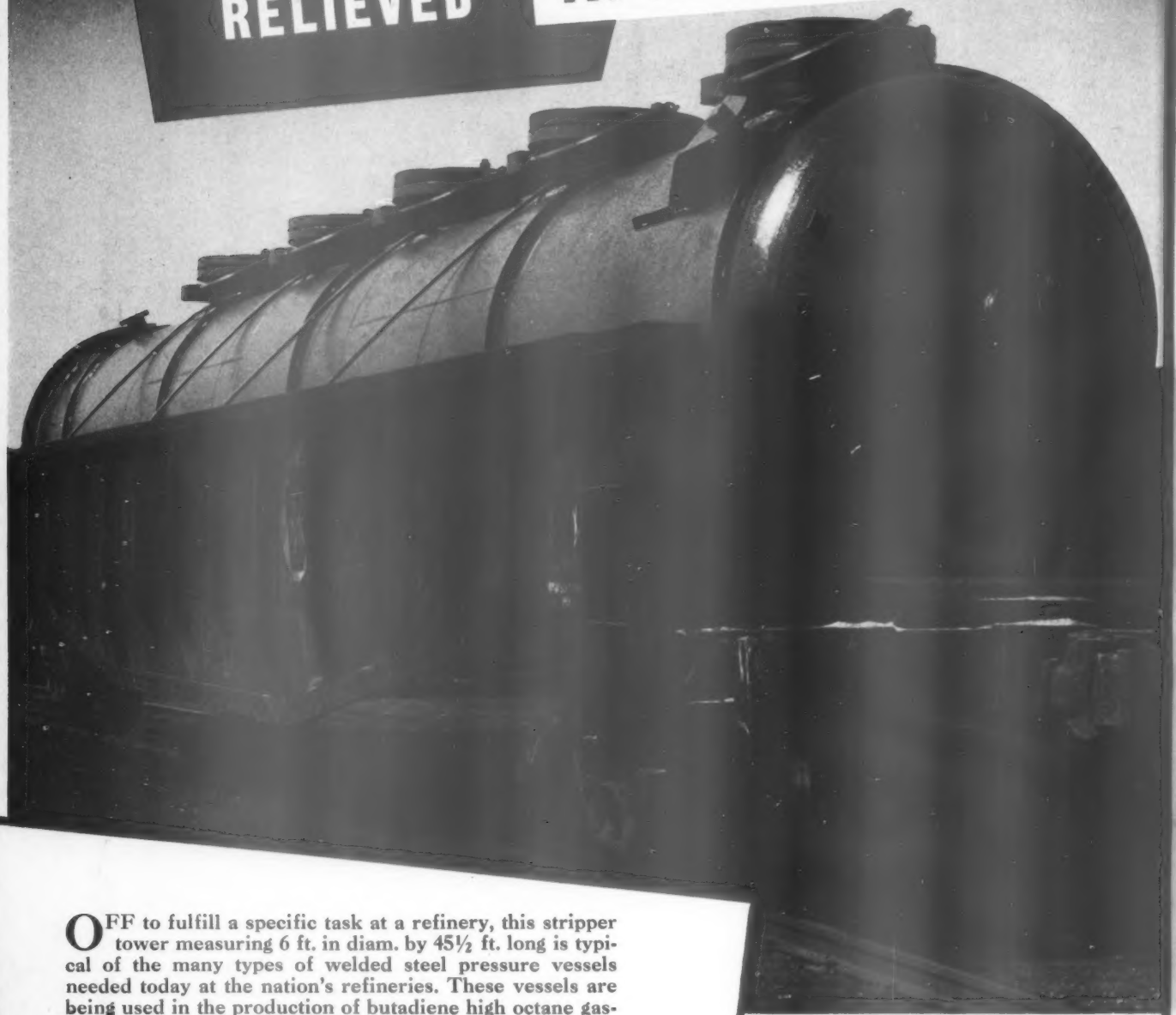
DESIGNED FABRICATED STRESS-RELIEVED FOR A SPECIFIC JOB AT A REFINERY



OFF to fulfill a specific task at a refinery, this stripper tower measuring 6 ft. in diam. by 45½ ft. long is typical of the many types of welded steel pressure vessels needed today at the nation's refineries. These vessels are being used in the production of butadiene high octane gasoline, toluene, synthetic chemicals and other vital products.

It is only natural that the petroleum industry should look to those who specialize in the designing and fabricating of pressure vessels when their production calls for such units. At our plant the designing and fabricating of pressure vessels is an old story. If governing specifications call for radiographing and stress-relieving, our Birmingham plant has complete facilities for this specialized work.

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the OIL AND GAS JOURNAL

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for Various Pressures and Temperatures
based on
A.S.T.M. and A.P.I. Specifications
and the A.S.A. Code for Pressure Piping

BULLETIN 43-A
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Originated and Developed by Engineering Department
MIDWEST PIPING & SUPPLY CO., INC.
St. Louis 4, Mo., U.S.A.

This bulletin will enable you to determine quickly and easily the required pipe wall thicknesses for commercial pressure and temperature conditions. All you do is select a factor from a table, divide it into the working pressure and then refer the quotient to a chart. You have no substitution in formulae . . . no extensive calculations . . . no reference to codes or specifications.

This bulletin will gladly be sent to anyone interested who requests it upon a business letterhead. Simply mention Bulletin 43-A and address the main office at St. Louis, Missouri.

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PIPING FABRICATORS AND MANUFACTURERS OF PIPE WELDING FITTINGS

the OIL AND GAS JOURNAL

Trends

Crude-Oil Production
By States — Page 68

CRUDE PETROLEUM 4,202,120 bbl. daily average—down 22,165 bbl. One year ago 3,971,485 bbl.

CRUDE STOCKS 236,486,000 bbl. as of Aug. 21—down 34,000 bbl. One year ago 246,307,000 bbl.

GASOLINE STOCKS 72,815,000 bbl. as of Aug. 21—up 310,000 bbl. One year ago 80,708,000 bbl.

RESIDUAL FUEL-OIL STOCK 66,724,000 bbl. as of Aug. 21—up 276,000. One year ago 78,098,000 bbl.

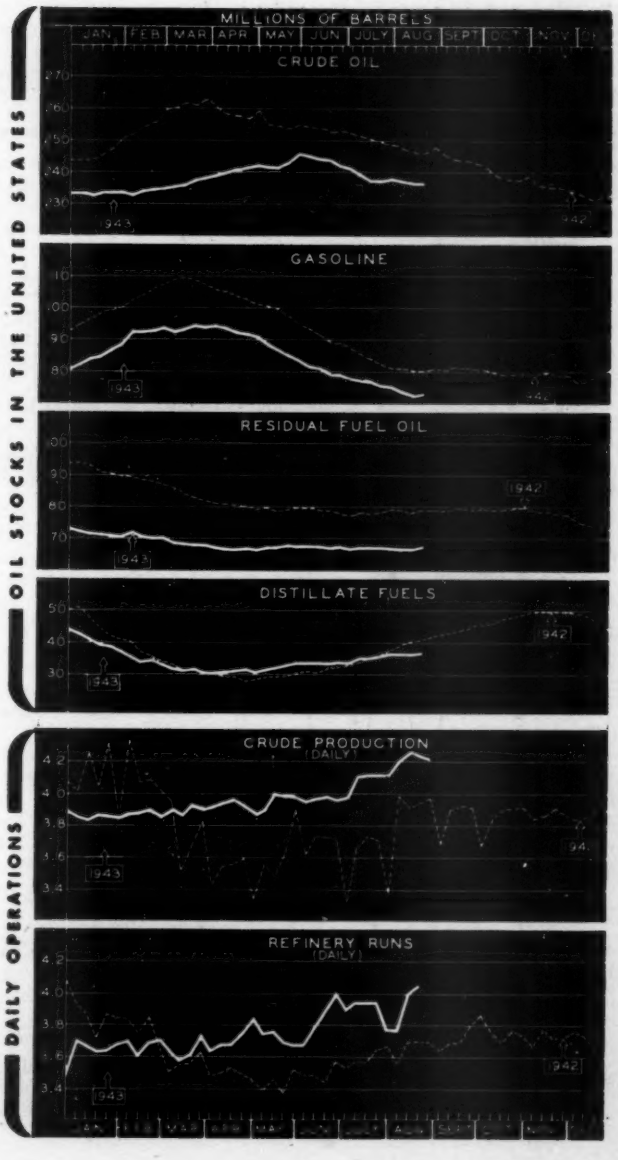
GAS OIL AND DISTILLATES 37,464,000 bbl. as of Aug. 21—up 890,000 bbl. One year ago 40,899,000 bbl.

REFINERY RUNS 4,046,000 bbl. daily week ended Aug. 21—up 42,000. One year ago 3,731,000 bbl.

IF there was one situation more outstanding than another in refinery operations over the past month it was that gasoline stocks had been reduced to a minimum. It is necessary to go back to 1936 to find gasoline stocks as low as they are now at the close of the summer months. Total gasoline demands in 1936 were 25 per cent less than they are now.

WHILE it has been pointed out by some that the country still has more than 40 days' supply of gasoline on hand, actually present inventories are below working requirements. In the case of some of the smaller refineries sizable stocks of gasoline are not necessary. In fact cases have been cited over the past few weeks in which trucks and tanks waited at plants while the gasoline was refined to fill them. For the industry as a whole, economists have pointed out it is necessary that refineries have supplies on hand which will permit efficient operations and at the same time assure that customers whose total requirements range from 100 to many hundreds of tank cars weekly, can be taken care of at all times. Numerous refinery operators during August when asked to make shipments from storage had to reply that they had no inventories.

IN this connection, it is explained that with the war restrictions in civilian use the usual seasonal decline in gasoline consumption starting in the early fall will not materialize. Civilian demands are based on a minimum pleasure use of motor cars with the bulk of the consumption accounted for by essential driving. With this situation in mind little or no reduction in civilian demands are in prospect for the remainder of the year, analysts contend, except as they are brought about by changes in the rationing program. Another fact about September refinery operations is that all types of military demands for gasoline are greater than was expected. While no definite program of production has been announced it is apparent that the output of all gasoline this month will total at least 50,000,000 bbl. Several million barrels of this total, it is said, should go to storage to build up a margin of safety which has not existed in recent weeks. But after subtracting this storage and the expected civilian requirements, it is apparent that the military demands are rapidly approaching the peak which military commentators projected as being necessary when the Allied war offensive reached a full-scale basis.



East Texas Bottom-Hole Pressure Showing Strain of Heavier Withdrawals

by Harry F. Simons

TYLER, Tex. — East Texas, the world's largest oil field, may soon be called to the attention of the oil-consuming public rather forcefully as the first large pool to break under the added war burden. It may also emphasize that an oil field is a delicate thing and that the oil industry's principles and practices cannot be flaunted without paying a stupendous price.

The field bulks large in the supply of the nation's oil and if it should be overproduced to the point where its output declined sharply, eastern civilian and military supply would be seriously affected. The recent acceptance of sour oil from West Texas in the 24-in. War Emergency pipeline is due more to a shortage of sweet crude oil to fill it than it is to a desire to expand the Permian basin markets.

Already the drop in the bottom-hole pressure in East Texas brought on by increased oil production has caused other changes. Until recent months it was almost standard practice for representatives of the operators to request more producing days, thereby raising the daily average production in the field. The Railroad Commission rarely granted them.

Now the shoe has been shifted to the other foot. The operators now request that the field's allowable be cut by reducing the number of operating days but the Railroad Commission refuses to grant the production cut. The Railroad Commission is on the spot as PAW requests minimum production from the pool and gets what it wants.

Avoidable Damage Opposed

This has led the spokesman for one large group of operators to make the statement: "We are willing to supply all the oil needed by the armed services, but are unwilling to have the world's greatest oil field damaged irreparably just to give eastern joy riders more gasoline on their A cards. The statement brings up the interesting conjecture of just how far government control of the oil industry should go and whether damage to a particular field can be forced on operators after years of regulation by state bodies to prevent such damage.

Overproduction of the field through increasing the number of producing days to 23 per month and increasing the daily allowable 12,235 bbl. is described by the operators as causing waste by irreparable damage to the ultimate maximum recovery of oil. There is a grimmer spectre haunting them—the reduction in the bottom-hole pressure in the pool to the point where all oil will have to be artificially lifted.

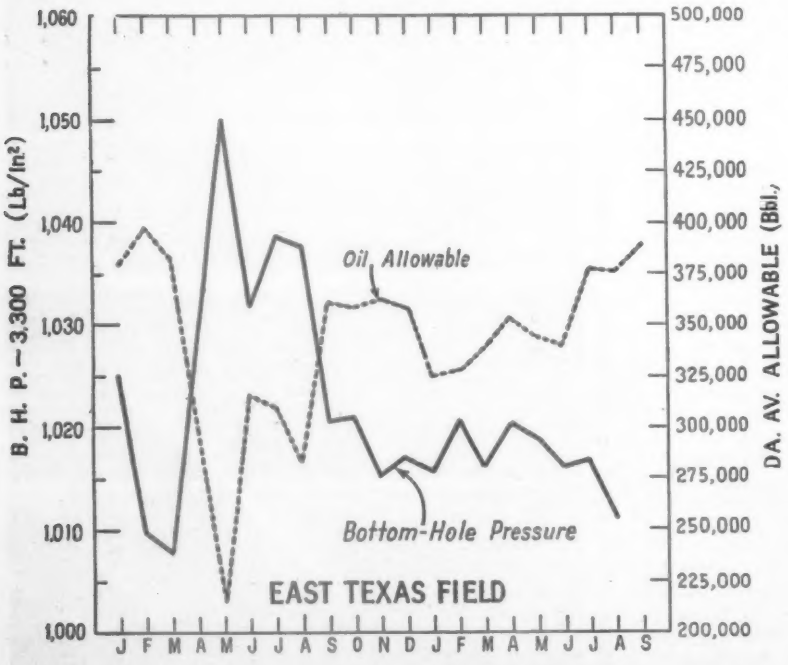
Installation of lifting equipment is a double burden at the present time. There is the difficulty of obtaining the equipment and there is the increased cost of producing the oil. The former has already caused the adoption by the Railroad Commission of a rule whereby an operator can apply for an allowable transfer on wells which cease flowing and for which operators do not have or cannot obtain pumping equipment. The price problem presents no cheerful prospect as the operators have seen the reluctance of OPA to grant an increase generally and they naturally do not like having to pay the added lifting cost of about 15 cents per barrel of oil produced if it possibly can be avoided.

Reservoir Pressure Sensitive

The recent bottom-hole-pressure and daily-production history are shown in the accompanying chart. It shows the responsiveness of the reservoir to changes in the withdrawal rate and that the bottom-hole pressure is at the lowest point since March 1942 when production was cut following a pressure drop to the all-time low.

Wells in the East Texas field should flow at a bottom-hole pressure above 800 lb. per sq. in. but actually most wells cease to flow, or flow with difficulty at about 1,000 lb. The figures shown on the chart for bottom-hole pressure are averages from 98 wells. The fact that the average is only 12.22 lb. per sq. in. above the practical flowing pressure is no comfort to the operators.

The oil-production figures tell only half the story as the salt-water withdrawal and injection figures are



Showing daily average oil allowable and bottom-hole pressure for 1942 and 1943

equally important. The return of the produced salt water to the Woodbine sand has been on the increase since the first of the year and it has been this factor which has permitted the increase in oil production with a minimum of damage to the reservoir. During the first 7 months of 1943 there were produced 72,136,576 bbl. of oil and 66,741,393 bbl. of salt water of which 33,257,640 bbl. was returned to the Woodbine sand. The average of 314,865 bbl. per day salt-water production compares favorably with the 435,550 bbl. of salt water per day being produced a little over a year ago. The return of an average of 109,234 bbl. per day during the period gives further point to the comparison as a little over a year ago only 87,000 bbl. was being returned. Actually the salt-water-injection program is further along than the average figures show. During the first half of August approximately 206,000 bbl. of water per day was returned with another 8,000-10,000-bbl. system going into operation and a second additional system with similar capacity going into operation shortly. This amounts to a reduction of net withdrawal of salt water of 233,000 bbl. per day and a reduction in total fluid withdrawal from the reservoir of 173,000 bbl. per day. The present figure for withdrawal of both salt water and oil is approximately 702,000 bbl. per day, while in May of last year it was 756,487 bbl. per day.

	May 1942	August 1943	Difference
Allowable oil production	316,937	387,381	+70,444
Water production	435,550	*315,000	—120,550
Total withdrawal	756,487	702,381	—54,106
Salt-water injection	87,000	206,074	+119,074
Net withdrawal	669,487	496,307	—173,180

*Estimated.

Both the operators in the field and the Texas Railroad Commission began over a year ago to get the field in shape for a sustained increase in production. In addition to inaugurating the salt-water-injection program of the East Texas Salt Water Disposal Co., which now accounts for 121,074 bbl. of the water currently returned to the sand, operators sought an allowable transfer plan. The commission refused this plan and put in a water-to-oil ratio rule of 10 bbl. of water (net) to 1 bbl. of oil produced from any one well. The commission also allowed ½ bbl. of oil for each 50 bbl. of water injected. In addition, the commission sought an increase in the allowable for the state from PAW so that crude inventories could be increased against the time when the demand would rise.

The commission's water-to-oil-ratio order was attacked through an application for a restraining order and the commission lost although the order practically remained in effect. During the trial, Commissioner E. O. Thompson testified:

"Experts tell us we could produce about 150,000 bbl. per day more oil if all the salt water were reinjected."

When asked about controlling bottom-hole pressures by shutdown days, Mr. Thompson replied: "There is only one trouble here. Unfortunately, that does not get the oil. The purpose is to produce oil, not shut down the field. If we could return all the water to the reservoir, we wouldn't need any shutdown days."

The East Texas Salt Water Disposal Co. speeded up its injection program by using converted oil wells within the field boundaries and was able to get 12 systems in operation with the material allotted by WPB for six systems. Water was injected for a charge of 1.8 cents per barrel.

The bottom-hole-pressure tests for August will soon be completed. If another drop of 4.76 lb. per sq. in. from the 1,012.22 lb. on August 1 is experienced, the next state-wide hearing of the Railroad Commission should be lively as far as East Texas is concerned. Or, if the PAW request includes another boost for East Texas, the old argument of allowable-transfer against water-oil ratio will again develop with increased water-injection facilities much in demand. If measures cannot be devised to keep the bottom-hole pressure up so that the bulk of the production from the field can be obtained from flowing wells, it will cause installation of an enormous amount of pumping equipment and a decline in output.

Journal Presents Series on Essentials of Oil Cracking

REFINERS at present are in the crosscurrents of cracking technology—the old, well-known fundamental principles and operating details of thermal cracking are the foundation of this technology on which now is being superimposed the new, partially disclosed principles and operating technique of catalytic cracking. The combination of this two-part science is the basis for the motor and aviation-fuel technology both of today and tomorrow.

C. R. WAGNER

The Oil and Gas Journal has arranged with C. R. Wagner, refining consultant and one of the foremost petroleum chemical technologists for a series of articles covering the technology of these two main phases of cracking petroleum oils, the first of which starts on page 27 of this issue. These articles are condensed not by omitting pertinent information but by careful writing to convey the maximum of data in the minimum of editorial space.

Every important phase of cracking technology will be covered as follows:

1. Historical discussion, and the theory of cracking reactions.
2. Causes of coke formation; properties of cracked products.
3. Recycle stocks; heats of cracking reactions.
4. Experimental thermal cracking equipment and results; Part 1.
5. Experimental thermal cracking equipment and results; Part 2.
6. Catalytic cracking and reforming.
7. Thermal reforming and gas reversion; Part 1.
8. Thermal reforming and gas reversion; Part 2.
9. Behavior of sulfur, oxygen and nitrogen compounds during cracking.
10. The future of commercial cracking.

The series discusses what happens in the decomposition of heavier hydrocarbons to form lighter molecules; the apparent mechanism of coke formation and the effect of quenching operations; effect of charge properties on character of products; effects of time, temperature, pressure on cracking results; cracking characteristics of recycle stocks; relationship of rate of cracking to rate of gasoline formation and gasoline properties; actual experimental results from cracking in pilot plants, data not heretofore published; essential principles of the four main catalytic cracking processes so far announced—Houdry, Fluid, Thermofor and Cycloversion; special consideration in naphtha reforming; effect of impurities on product quality and on cracking procedures.

The series will be completed by a conservative study and discussion of the possible routes which commercial cracking may follow in the future, especially postwar. It will be a summary of the possibilities which lie in thermal and catalytic cracking and what may be done with them.

WPB Earmarks Sufficient Steel for Big Gas Line

WASHINGTON, D. C.—Construction of a gas line from the Southwest to the Appalachian areas by the winter of 1944-45 was virtually assured this week by War Production Board's announcement that required materials for a 1,200-mile line will be made available.

WPB advised the Federal Power Commission that it would approve materials for the line as soon as FPC decides which of two applicants will build the system.

Hope Natural Gas Co. has applied for authority to build a line from the Hugoton field in Kansas and Oklahoma to West Virginia. Also pending, is an application by Tennessee Gas & Transmission Co. for a permit to build a trunk line from Texas to West Virginia.

Either of the two lines would require about 215,800 tons of steel and WPB said that it was up to FPC to designate which of the applicants should receive the certificate.

Ickes and Davies Refute Charge of Impeding Illinois' Oil Production

WASHINGTON, D. C. — Petroleum Administrator Ickes and Deputy Administrator Ralph K. Davies last week took sharp issue with Illinois legislators who accused the PAW of restricting crude-oil production within that state.

Mr. Davies commenting on a statement made by Illinois State Senator Earl B. Searcy, said:

"State Senator Searcy is quoted as stating that PAW is restricting wells, capable of producing 150 bbl. a day, to 20 bbl. daily. The simple fact is that PAW does not restrict production from any wells.

"Some of the states have regulatory bodies which do restrict production in order that wasteful production this month will not mean a decreased production next month, and a severe loss in the amount of oil ultimately to be recovered from the well before it runs dry. Incidentally, the state authorities have done a good job of this.

"Illinois does not have a conservation body with authority to enforce conservation. That state would be producing much more oil today and would have produced a lot more oil during the period of the war if its fields had not been gutted by wasteful operations during the course of earlier development and production.

"The belief that PAW restricts well production stems undoubtedly from the fact that we certify to the oil-producing states the quantity of oil which should be produced from each state during each month. Immediately after the outbreak of the war the discontinuance of tanker shipments from the Gulf to the East Coast, because of sinkings and need for tankers elsewhere, made it necessary that the production from the oil-producing states be coordinated so as to make the most effective use of available pipe line and overland transportation facilities.

"The rates established for the states by PAW had only the force of persuasion, and not of law. In setting these rates we called upon the states whose production was readily accessible to the East for maximum production.

"Never, since PAW has been establishing these rates, has the State of Illinois been able to produce as much as was requested of it.

"As more transportation facilities became available to the prolific fields in the Southwest, certified rates were increased. The fact is that recently, oil operators and state officials have complained to us that the rates for their states were too high.

"The only restrictions being placed on oil production today are imposed either by the state authorities, for the purpose of conservation, or by the lack of transportation facilities. Where more than one state must share in the limited available transportation facilities, PAW does recommend how the sharing should be done. To this extent and to this extent only does PAW participate in the control of production. Except in limited areas in the Southwest where sufficient transportation is not available, every oil field in the United States is producing at or substantially at maximum efficient capacity.

"Another complaint which we frequently receive is that PAW is holding down production by restricting drilling. The fact is that there are no restrictions of any kind upon exploratory, or 'wildcat' drilling. The drilling for nonexploratory, or development wells has been restricted automatically because of the shortage of steel and other critical materials.

"If it had not been for the standard placed on oil well drilling immediately after Pearl Harbor the industry's inventory of oil well casing would have been used during the first few months of 1942 in drilling closely spaced wells."

Cabinet Officers Top Executives in PRC

WASHINGTON, D. C. — Secretary Ickes, as president of Petroleum Reserve Corp., announced August 30 that directors of the agency are secretaries of state, war, navy, interior, and the director of the Office of Economic Warfare. Referring to speculation as to program and activities of PRC, Mr. Ickes said:

"I regret that no information can be made public at this time as to the corporation's work. It is engaged in war activities of a nature requiring secrecy for their success. However, the public will be informed of the scope and nature of its general purposes just as soon as this can be done without imperilling the prosecution of this war in which petroleum plays such a decisive part in all fronts."

Three Men Added to PAW District 1 Staff

NEW YORK.—Three men have been added to the District 1 staff of the Petroleum Administration for War, it was announced this week.

James P. Patterson, manager of the marine department, terminals and transportation for Pan American Petroleum & Transport Co., New York, has been appointed District 1 director of transportation. Edward H. Kares, associated with Standard Oil Development Co. since 1923, has been made District 1 director of refinery construction. He directed construction of refineries and terminals here and abroad at Port Jerome, France; Caripito, Venezuela; and in Italy, Rumania and North Africa.

Edwin W. Esmay, formerly assistant to the chairman of the Petroleum Industry War Council and publicity director for the A.P.I., has been made assistant to the director in charge and will handle public relations.

THIS WEEK

TRANSPORTATION—WPB makes commitment for 215,800 tons of steel pipe to build 1,200-mile gas line. . . . Which of the two companies will build the transcontinental system, where it will originate, other details, remain undecided. . . . It's a "must" by winter of 1944-45, WPB admits. . . . ¶WEP's Norris City terminal handling 308,000 bbl. of crude daily; 133,000 bbl. going by recently completed eastern extension of line, remainder via tank cars and Ohio Oil Co.'s Enfield line. . . . ¶Government considering compensation for freight charges, permitting rail movement of 50,000 bbl. of sour crude from West Texas to District 2 refineries. . . .

REFINING—District 2 refiners instructed to increase eastern shipments of automotive gasoline 50,000 bbl. daily—without interfering with PAW allocation to interior states. . . . ¶Contract awarded for new hydrogenation plant at Humble Oil & Refining Co.'s Baytown, Tex., refinery. . . . ¶Compania Consolidad de Petroleo (Sinclair) reported considering refinery on northern coast of Venezuela, to operate on Santa Barbara field crude. . . . Texas Co. places new toluene plant on stream at Chicago area refinery. . . . ¶Union Oil Co. of California forms separate chemical division, following a trend of other manufacturing units, and aimed primarily at postwar era. . . .

FOREIGN—Venezuelan production reported climbing steeply. . . . ¶Exploratory wells for Province of Magallenes, Chile, proposed with U. S. Government aid. . . . ¶Administrator Ickes discloses board of Petroleum Reserve Corp., is composed of secretaries of state, war, navy, interior and director of OEW. . . . Says operations are directly related to war, can't disclose details for fear of imperilling success. . . . ¶A pipe line, "several hundred miles long," completed in India, reports Department of Commerce. . . .

TECHNOLOGY—Discovery of process disclosed for making triptane, for $1 per gallon. . . . Previously, while a laboratory curiosity cost $3,000 per gallon. . . . Has highest antiknock characteristics of any known hydrocarbon, opening higher performance goals to Allied aircraft. . . .

PRODUCTION—East Texas field reflecting dangers of excessive withdrawals. . . . Operators objecting to current allowable, want it cut back. . . . Current survey of bottomhole pressure, if down substantially, will intensify producers' objections. . . . ¶Administrator Ickes and Deputy Davies refute assertions PAW is restricting Illinois' production. . . . State's failure to meet single PAW production quota cited as supporting evidence. . . .

MATERIALS—Change in P-98-c permits sales both of new and used equipment to supply dealers for resale to other operators. . . . ¶WPB creates special section for exclusive service of petroleum equipment problems. . . .

This trickle of crude oil, the first to reach the East Coast through the WEP system, soon will be at the rate of several thousand barrels daily as soon as testing 20-in. laterals, under way this week, is completed. Walter Partner regulates the gate valve. George Brigance opens the bleed-off line and Hugh Lambert catches the first oil. International News

Process Perfected for Synthesis of Triptane, Aviation Superfuel

by Arch L. Foster

COMMERCIAL synthesis of triptane, isoparaffin possessing the highest antidetonation characteristics of any known hydrocarbon, is made possible by the discovery of a method for its catalytic synthesis by Drs. V. N. Ipatieff, professor at Northwestern University and director of chemical research for Universal Oil Products Co., and Vladimir Haensel, Universal research chemist. This process, developed in collaboration with Universal's technical research staff, makes practicable the commercial production of triptane at a cost of less than a dollar per gallon, according to a Universal announcement this week, whereas in the past the cost has been up to $3,000 per gallon.

According to the announcement, the synthesis includes two steps, the first starting via a catalytic route with "condensable gases produced in petroleum refineries as byproducts of catalytic or noncatalytic cracking or reforming of petroleum oils." Details of the process are withheld because of wartime restrictions, but statement is made that from the "charging stock produced in the first step" a 90 per cent liquid yield is obtained, 50 per cent of which is triptane. Two other hydrocarbons are produced in considerable quantities at the same time, both of which are extremely high in antidetonation qualities which therefore make them less of a detriment than otherwise would be the case in aviation-fuel blending. Each is superior to alkylate, the major high-octane number constituent of current 100-plus aviation fuels. The process for the new synthesis has been operated more than 300 hours in a pilot plant without any appreciable reduction in the activity of the catalyst, it is stated.

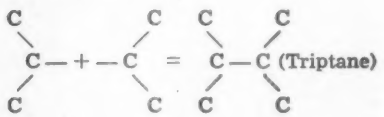
Triptane is credited in current technical literature with a Research Method octane number equal to pure isooctane plus 1.83 cc. of tetraethyl lead, a value well above 100 octane number which is the rating by definition, of pure isooctane. Its octane number in blending with other hydrocarbons is placed at 112.5 which makes it extremely valuable in furnishing the Allies with the most powerful aviation fuels in the world. This fuel produces greater power in suitable engines than any hydrocarbon known or used at present, scientists state. Of the other two products 2,3-dimethylbutane (diisopropyl) shows an octane rating of higher than 100, and a blending rating up to 106.5. Appreciable amounts of 2,3-dimethylpentane are formed and it shows an octane number of approximately 95 in blending with other fuel components. The following table shows some physical characteristics of these three products:

Compound—	Boiling point °C.	Boiling point °F.	Melting point °C.	Melting point °F.	Refractive index, nD^{20}	Specific gravity
2,3-Dimethylbutane	58.0	136.4	—128.8	—199.8	1.3750	0.6620
2,2,3-Trimethylbutane (triptane)	80.8	177.4	—25.0	—13.0	1.3894	0.6901
2,3-Dimethylpentane	89.7	193.5	.....	.....	1.3920	0.6944

These reaction products are said to be saturated, free of impurities and to require no further treatment before blending into aviation superfuels.

The catalyst employed is stated to be readily available in large quantities. No special equipment is needed for commercial plants, and temperatures and pressures are "well within refinery experience," according to the announcement.

Commercial development of synthetic methods for making triptane have been studied vigorously by American research chemists and technologists for several years, hitherto unsuccessfully. This research has been given greatly increased impetus by the war and its requirements for superfuels for aviation. Nothing is stated regarding the details of the synthesis, but triptane could be synthesized theoretically by uniting two isopropyl radicals,



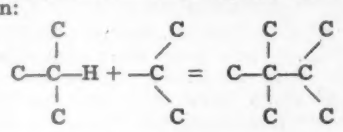
The isopropyl groups may be obtained by the dehydrogenation of propane. Other possible methods for its synthesis exist. Just which one is used in this process not being disclosable for the present.

2,2,3-Trimethylbutane may be syn-

Prof. V. N. Ipatieff, director of chemical research, Universal Oil Products Co.

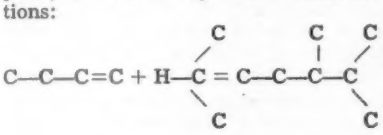
Dr. Vladimir Haensel, Universal Oil Products Co. research chemist.

thesized by the alkylation of isobutane with propane, the latter joining the isobutane in the isopropyl position:



(2,2,3-trimethylbutane)

Other possible methods also exist for this synthesis. 2,3-Dimethylpentane may be made from butene-1 and propane; as well as by other combinations:



(2,3-dimethylpentane)

Dr. Vladimir Haensel is the first Ph.D. graduate from Dr. Ipatieff's newly established high-pressure catalytic laboratories at Northwestern, and is employed as research chemist by Universal. Dr. Ipatieff is internationally known for his researches in high pressure and catalytic reactions, and has developed some of the most important catalytic processes used by the refining industry, including catalytic polymerization, alkylation, etc. He celebrated recently his seventy-fifth birthday and, although born a citizen of Russia where he was a general officer during World War I in charge of chemical industries, he has been a citizen of United States for many years.

Chilean Exploratory Program Is Outlined

Favorable indications of petroleum deposits in southern Magallenes Province, Chile, is reported this week by the Department of Commerce, Washington, D. C., to have resulted from exploratory operations by American engineers.

Preparations are under way, the Department of Commerce said, for drilling exploratory wells.

Oil Pipe Line Is Completed in India

British engineers have constructed a new oil pipe line in India, extending several hundred miles, says a British publication referred to by Foreign Commerce Weekly. It is expected that the new pipe line will do much to relieve the strain on the overloaded transport services of the country.

The project was completed a week ahead of schedule through the combined efforts of engineers, the Army, the oil companies, the railways, the local authorities, and the government departments.

First Issue of Journal's New Latin-American Affiliate One Of Largest Initial Numbers

VOLUME 1, Number 1, of Petroleo Interamericano, the Latin-American affiliate of The Oil and Gas Journal, rolled off the presses last week and was mailed to readers connected with oil operations to the south of the United States.

The 160-page publication was one of the largest initial issues in the history of trade journalism. Indicative of the interest in present and future oil developments of the Spanish-speaking countries, approximately 100 concerns representing manufacturing, supply, distributing and service organizations were represented in the advertising pages.

As previously announced, the new magazine is bilingual (Spanish and English) and will appear bimonthly.

An important feature of the initial issue, and one which will be continued in later issues, is a glossary—both English-Spanish and Spanish-English —of words used in the oil industry. The first instalment is confined to drilling terms; subsequent instalments will be devoted to other branches of the industry. So far the English terminology in equipment and oil technology has been understandable mainly to professionally trained South Americans, for generally these men read, and possibly speak, more than one language. But to the hundreds of nontechnical men who are now coming into the ranks of the oil industry, the lack of an organized vocabulary presents a serious handicap. The glossary in Petroleo Interamericano is designed as a basis for a standardized vocabulary in Spanish and English.

Other Features in Issue

Other features in the first issue include a statement by Harold L. Ickes, petroleum administrator for war; an article on Latin America and the War, by James Terry Duce, PAW's director of the foreign division; several engineering articles; a review of trends in petroleum technology in all its branches; an educational feature, describing in simple, easily understood language, the principles of beam pumping; an economic review; a review of new equipment, and a variety of short miscellany.

In his statement on the objectives of the new publication in the first issue, Dr. Oscar B. Irizarry, editor, said in part:

"Today, more than ever, the attitude of the people of the United States is one of warm friendship and better understanding toward the peoples of Latin America.

"And this attitude is not the result of a sudden realization that Latin-American cooperation is needed to win the war. It antedates the European events. For the last decade American public opinion has shown so much interest in the subject of Latin-American friendship that it has profoundly influenced our national Government to strengthen the structure of inter-American relations.

Good Neighbor Policy

"In 1933 we stated at Montevideo our basic principles of the Good Neighbor Policy; in 1936 we established the practice of consultation at Buenos Aires; in 1938 we proclaimed, at the Lima conference, the doctrine of the common defense of this hemisphere; and in 1939, at Panama, we took steps to implement that doctrine.

"In view of these developments, American business — and especially the oil industry with its assurance of unprecedented growth in Latin America—cannot remain detached from the natural course of events. It must, on the contrary, do its part to further strengthen the ties of mutual service and cooperation. It is in this spirit that the publishers of The Oil and Gas Journal present Petroleo Interamericano to readers in both continents."

Senate Committee to Probe Canadian Oil Operations

WASHINGTON, D. C.—The oil development in northern Canada, understood to be financed and controlled by the U. S. Army in connection with the Alaska Highway, is expected to be examined by a subcommittee of the special Senate committee investigating the national defense program.

Sen. Harry S. Truman of Missouri, chairman of the committee, announced that a subcommittee composed of Senators Kilgore of West Virginia, Wallgren of Washington, and Ferguson of Michigan has left for Alaska to investigate a number of Army and Navy projects in the far North.

Standard of New Jersey Supports Higher Prices

UNQUALIFIED support of a higher ceiling price for crude oil to assure "adequate supplies of oil, however long the war may last," is advocated by Standard Oil Co. (New Jersey) in an editorial which will appear in the forthcoming issue of The Lamp, company publication.

Current earnings of most companies and arguments that a rise would be an inflationary move are "beside the point" the editorial asserts. The company points out that the small oil producer is being forced to liquidate his business and compares this faction of the industry with a storekeeper who sells his merchandise at a profit on its cost to him but not at sufficient price to replace his inventory.

The company declared the situation cannot be met, as has been suggested, by imports of oil, and added that it could not advocate that the nation should depend in time of war on imports of a "veritable sinew of war."

"Standard Oil Co. (New Jersey)," the editorial declares, "believes the recommendation of Petroleum Administrator Ickes is sound. Our views are clearly summarized in a statement published by a member of our board in July 1941.

High Prices Promote Exploration

" 'To serve their primary function of balancing supply with demand, crude-oil prices must not only return full costs plus a reasonable profit to the efficient producer; they must also offer an additional reward to stimulate exploration sufficiently to maintain adequate reserves. High prices increase the volume and efficiency of exploration; low prices stifle exploration.

" 'Crude-oil prices have increased over recent years but the increase has been moderate and a further increase is required if oil-finding activity is to be stimulated.'

"It is naively suggested," the editorial continues, "that all our troubles will vanish if we simply 'import more oil from South American countries.' This suggestion ignores one sinister fact; the submarine. We are a nation at war. Our very life depends on oil; oil here on the home front as well as on the battle front. We all know that the flow of imported oil can be paralyzed over night; it has been paralyzed for months on end within the last year. Our company owns extensive oil-producing properties in South America and for many years we have brought into this country substantial imports of oil from South America. We believe this policy on our part serves the best interests of our own country as well as of our neighbors in South America. But we would never advocate that our country, in time of war, should depend on imports over enemy-infested waters for oil.

> The Jersey company's endorsement of higher crude prices is predicated on necessity of maintaining the independent operators' position in the industry. Continued liquidation of independents, the company avers, will have damaging effect on exploratory results.

"Mr. Ickes' critics charge that the increase he recommends would open wider 'the gates to inflation.' This charge is debatable but to refute it is hardly pertinent; again the argument is beside the point. We are at war and certain aspects of war are by their very nature inflationary. Germany has learned that oil, for example, is indispensable to war, whatever the cost. Our country also must continue to possess adequate supplies of oil, however long the war may last; and this oil must be available here at home even if costs of production do increase.

"Finally Mr. Ickes' critics offer some medicine of their own to cure our sick oil-finding industry. They would have Uncle Sam pay a subsidy in the form of a premium price for oil produced from new wells; and they would supplement this lure with government loans to cover part of the cost of drilling new wells. Government loans and subsidies are the devices of a regimented economy; they are not the way of democracy. Moreover, every experienced oil man knows that the proposed treatment will not cure our trouble. Similar rewards have been tried repeatedly, and repeatedly they have failed. The very suggestions reveal that the proponents just do not understand what makes our oil-producing industry tick.

"Our method of finding oil fails, however, unless we have always on the job a multitude of independent wildcatters. In no other way can we maintain the activity of drilling the thousands of wells we require every year to guide our research intelligently. But we are not maintaining our multitude of wildcatters. As time goes on we drill fewer and fewer wells. Twenty years ago both the 5-year total and the 1-year total of wells drilled in search for oil was larger than it is now.

"The fundamental factor in stimulating exploration has always been a crude oil price high enough to convince the small producer that it will be profitable to do a little exploring for new oil fields. It does not always suffice to pay him a reasonable profit on his current production; that production may have cost him less than he thinks he must spend to find new supplies. He must be confident that the price he is to receive will exceed the cost of the new supplies he hopes to find. Crude-oil prices are too low today to inspire that confidence. If 1926 be taken as the year of parity prices, then crude-oil prices are far below parity. Yet oil-finding costs mount higher and higher. Drilling costs are inflated; more dry holes are drilled for each barrel of oil found; and the average test well must go deeper each succeeding year. Well may the small operator fear he cannot find new oil to replace the oil he is marketing today except at a cost that current prices do not permit him to contemplate.

"The narrowing margin between costs and prices pinches the small operator before it is felt by the large operator whose reserves are often more ample. We are deliberately sacrificing the most precious heritage the experience of the American oil industry has bequeathed to us, the small oil producer; but if we look more closely we shall discover that we are all in the same boat with him. Under the American system the industry that fails to support its small operators is on its way out."

Contract Let on Humble's Hydrogenation Unit

HOUSTON, Tex.—Contract has been let to Stone & Webster to construct a hydrogenation unit at the Baytown, Tex., refinery of Humble Oil & Refining Co., according to a statement made by officials August 28.

It was stated that the new unit will cost $2,000,000. Work is to start immediately. The hydrogenation process is for production of high-octane gasoline.

FOUNDED IN 1910

BY PATRICK C. BOYLE

the OIL AND GAS JOURNAL

Record Demands Arrive

PRODUCERS and refiners in September are asked to bring more oil to the surface and to manufacture more finished products than in any previous month.

The PAW allocation of liquid petroleum is 4,552,000 bbl. daily. This means that the production of petroleum in this country has reached the yearly rate of nearly 1⅔ billion barrels or 4½ times the average production during the first World War.

Expansion at refineries this month will parallel the increased production of the fields. While no official schedule of operations has been announced crude runs to stills at 450 operating refineries are expected to average about 4,100,000 bbl. daily.

The September production of all gasolines would have supplied the export and domestic demands of this country for more than 6 months during the other war. In fact the output of aviation gasolines this month will be comparable to the production of all gasolines in September 1918.

A reader familiar with the projected operations for this month wants to know "how it is going to be done." The complete answer to that query would require replies from thousands of producers and hundreds of refiners. They would reveal that in many areas producers, to carry out their allocations, are taking more oil from their leases than is desirable. Conservation principles are being violated. Properties are being drained without regard to current or ultimate costs.

There are areas which could produce more crude oil but they either do not have adequate transportation facilities or the crude oil does not possess the properties required for the manufacture of essential war products. The lack of transportation reflects the fact that the construction of pipe lines has been largely confined to the laying of emergency lines.

Generally, most of the oil-country properties are being operated at capacity with new discoveries only offsetting a small part of the now record output. All this is being done with drilling operations less than 50 per cent normal.

Conditions among refineries vary. Many are operating in excess of rated capacities, taxing every facility they have to manufacture the needed quantities of finished products. Other plants whose crude supplies are dwindling due to the production situation are making every effort to maintain the maximum output of the most essential products.

Except where the manufacture of war products is directly involved these manufacturing operations have been carried on over the past 2 years with a minimum of practically everything. Processing units which normally would have been rebuilt have been kept operating continuously through the ingenuity of plant operators. Refining activities are duplicated in the operations of more than 600 natural-gasoline plants and cycling plants.

The conclusion to this brief outline is known to those who have the responsibility of management. These peak operations which those in charge of petroleum supplies for the Government have said must be expanded further from month to month cannot be maintained with a continuance of makeshift and day-to-day policies.

Official announcements have explained the emergency construction phases of the petroleum industry's contributions are nearing a close. That fact should end the last excuse that Washington has for further delay in the establishment of a permanent program assuring materials, manpower and price commensurate with the tasks already here.

Stanolind Gears Supervisor and Employe Training to War-Accelerated Needs

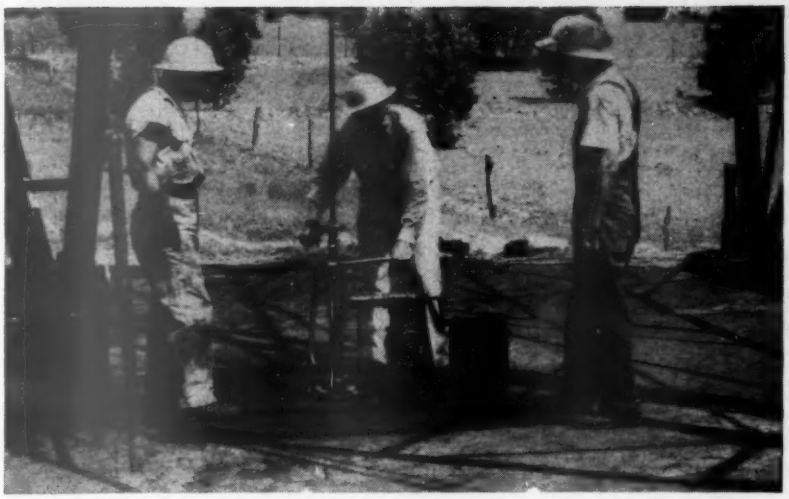
This report on how Stanolind Oil & Gas Co. has organized its program for the training of new employes and supervisory personnel was prepared by the staff of the industrial relations division. Current emphasis and expanded activity is aimed at coping with wartime-manpower conditions

FOR several years before the national emergency, Stanolind Oil & Gas Co. had been giving increasing attention to training of supervisors. Early in 1942 it was decided to gear the training program to the rising need for quick, effective training of both supervisors and employes. To this end, educational effort was placed on an organized basis with a long-range, two-fold program envisioned: (1) Uniformed training of supervisors at all organization levels; (2) specific

Right: T. H. Andrews, district superintendent in the Gulf Coast division, conducts a conference in the Hastings area on "Supervisory Responsibilities." Members of the Hastings management present are: Back row, left to right: J. H. McKean, gang pusher; C. D. Griffin, farm boss; J. W. Sewell, assistant field clerk; M. H. Lang, tool pusher; R. Q. Fidler, production foreman. Front row, left to right: P. G. Hardie, division industrial relations supervisor; George McCray, field superintendent; H. S. Quick, field clerk; P. D. Laughter, farm boss; G. W. Davis, farm boss; Ralph H. Smith, field engineer.

Left, top: In the conference held in the East Texas area of the North Texas-New Mexico division, John B. Rosen, petroleum engineer, division office, Fort Worth, is acting as conference leader. Members of the East Texas management are: Back row, left to right: C. J. McCrory, farm boss; I. V. Robinson, farm boss; L. J. Phillips, gang pusher; H. F. Ulmer, gang pusher; H. V. Mathews, production foreman; Ralph Ludwick, field engineer; R. A. Armstrong, farm boss. Front row, left to right: J. C. Rhodes, gang pusher; Spencer Gee, gang pusher; F. W. Born, production foreman; C. R. Nichols, assistant field engineer; J. J. Fletcher, field clerk; Ira L. Page, field superintendent.

Left bottom: D. H. Crall, field superintendent of the Wewoka area, central division, conducts a conference on "Foremanship" for his field staff. Present from left to right around the table are: D. F. O'Neil, gang pusher; E. A. Sticher, farm boss; A. C. Ball, farm boss; T. C. Heiner, production foreman; S. S. Allen, field clerk; William Holbert, district superintendent, Oklahoma-North Louisiana district; Jack Bronaugh, gang pusher; W. E. Richards, gang pusher; Frank Lane, clerk; Edward Wickhorst, division industrial relations supervisor; R. R. Ullstrom, field engineer; Charlie Riden, head roustabout; R. D. Bowles, assistant field clerk; O. R. McNatt, head roustabout; O. P. Rexroad, gang pusher.



Top: R. P. Darney explains and demonstrates to C. R. Jackson and W. L. Ellis the correct way to wrench rods. (East Texas area, North Texas-New Mexico division.)

Above: I. T. Arnett, gang pusher, explains and demonstrates to C. A. Satterwhite the proper method of throwing a catline on the cathead of a pulling unit. (South Houston area, Gulf Coast division.)

job training of new employes.

An organized, coordinated supervisory training course was developed with the idea of preparing line management to take greater responsibility for the development of new supervisors and for the training of new employes. Throughout 1942 the whole educational effort was directed toward leadership training.

Objectives of this program may be stated as follows: (1) Exchange of ideas and stimulation of thought on supervisory problems: (2) development of uniform understanding and appreciation of the meaning and importance of organization, as it affects the average supervisor; (3) systematic analysis of the functions of operating management, in order to establish broad working principles; (4) recognition of the fact that supervision involves much more than specific technical and mechanical knowledge and skills; (5) dissemination of background information relative to company policy and procedures. In short, the aim of supervisory training is to stimulate all levels of management to analize and plan, and to give them the necessary tools for such analytical thinking.

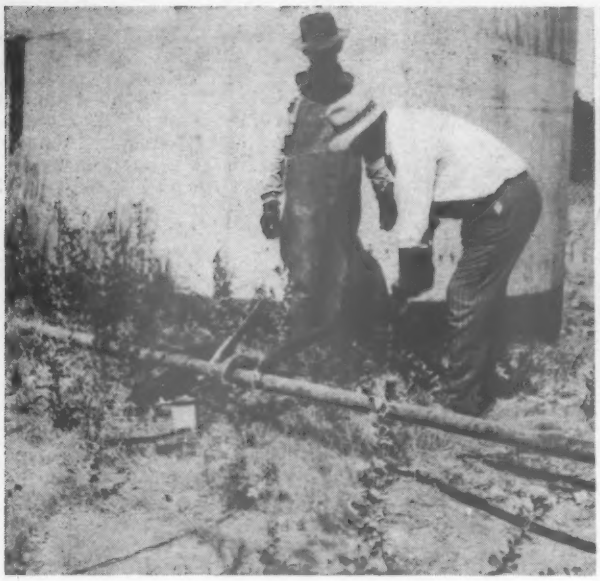
Based on Conference Method

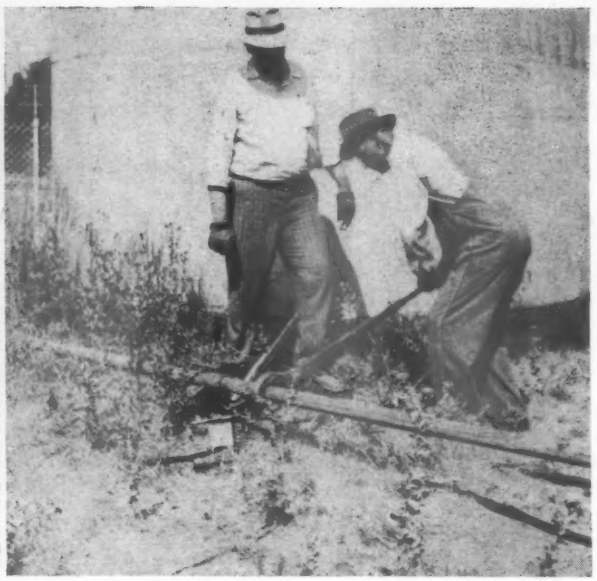
Based primarily on the conference method, supervisor training included during 1942 the analytical study of basic principles of good supervision. Then, in 1943, this program was expanded to include more specific subjects involving application of basic working principles already established. For instance, methods and techniques of job training, analyses of employe benefit plans and of the company's labor policy are included in the supervisory training program for the remainder of 1943 and for 1944.

Responsibility for initiating and coordinating the program has been placed on the educational branch of the industrial relations department, with the intention that line management itself would assume the main burden of carrying on the program.

From the beginning, management interest and response were excellent. Enthusiasm continues to grow. In fact, line management has followed the initial lead in many instances by further developing their own supervisory training and also by inaugurating the systematic preparation and training of new men. A number of

Supervising the application of previous instruction—installation of a pipe-line swing. (Salt Creek area, Rocky Mountain division)





Above: Ace Ball, farm boss, demonstrates to Ben Crow the proper way to buck up pipe. At the right he completes his teaching job with supervised application. (Wewoka area, central division)

superintendents and supervisors have become interested in the conference method of training and are actually applying it in their respective areas.

Shown here are photographs illustrative of the initiative being shown by field management groups in carrying on supervisor conferences.

Supervisory conferences on the theory and methods of job training early in 1943 added impetus and order to the training of new men. Supervisors in all areas, especially first-line supervisors, are following a more systematic program in the induction and development of new and inexperienced employes.

On the assumption that the good supervisor is also a good teacher, supervisors are being shown and encouraged to use advanced methods and techniques of teaching in order to put across to new men the key points of their various field jobs.

In general, supervisors have been quick to realize the value of this methodical approach to job training. They see in such procedure not only the acceleration of the learning process, safer and more efficient job performance, and better morale among workmen; but also, as time goes on, a tremendous lightening of the supervisory burden.

Below: Ace Ball shows George Merritt how to shovel dirt. At the right he is shown correcting an error in technique. In the small picture a new man is being given instructions in wrenching rods.

Forty Per Cent of Gasoline Output Destined for Military Use in 1945

WASHINGTON, D. C. — Nearly 1 out of every 3 gal. of gasoline produced in refineries east of the Rocky Mountains during the last half of 1943 is destined for ultimate consumption by the military, the Petroleum Administration for War disclosed today.

Reporting on the steadily mounting military demand for aviation and other gasolines, Deputy Administrator Ralph K. Davies announced also that:

1. During 1944, the armed forces will require an estimated 37.6 per cent of all the gasoline of all kinds manufactured by refineries in PAW Districts 1, 2, and 3 (the area east of the Rockies).

2. By 1945, according to the best information obtainable, the military will consume 2 out of every 5 gal. of gasoline produced by these same refineries —to be exact, 39.6 per cent.

By way of contrast, Mr. Davies reported that in 1942 only 12.5 per cent of the total gasoline in Districts 1, 2, and 3 went to the military. During the first quarter of this year, the military take amounted to 21.4 per cent, and in the second quarter it was 23.1 per cent. The percentage requirement for the last half of 1943 is estimated at 30.6 per cent.

War Emergency Tankers Formed to Aid Shipping

NEW YORK.—Responding to a request from the War Shipping Administration for additional operators of the Government's rapidly growing tanker fleet, a new organization in the oil industry known as War Emergency Tankers, Inc., has been incorporated under the laws of Delaware, and it is expected will shortly enter into an agreement with the War Shipping Administration. In order to make a further contribution to the Allied war effort and at the same time not disrupt present organizations within the industry, WET was suggested to act as general agent for the Government, the companies sponsoring the corporation to be its principal subagents. This cooperative venture will be dissolved at the end of the war.

Under the proposed agreement between the new corporation and the WSA, WET will assign ships to its principal subagents, who in turn will use their present staffs for the physical operation and maintenance of the tankers, under government direction and regulation.

The directors of WET are: H. G. Schad, Atlantic Refining Co.; J. P. Patterson, Pan American Petroleum & Transport Co.; A. E. Watts, Sinclair Refining Co.; Charles H. Kunze, Socony-Vacuum Oil Co., Inc.; B. B. Howard, Standard Oil Co. of New Jersey; Charles R. Innis, Sun Oil Co.; T. E. Buchanan, Texas Co.; Richmond K. Kelly, Tide Water Associated Oil Co., and Ira A. Campbell, of Kirlin, Campbell, Hickox, Keating & McGrann.

District 2 Refiners Told to Increase Eastern Shipments

WASHINGTON, D. C. — Movement of an additional 50,000 bbl. per day of automotive gasoline into District 1 was ordered August 23 by W. W. Vandeveer, director in charge of District 2, Petroleum Administration for War, in Chicago.

The higher quotas are in addition to District 1 shipping schedules previously established and are not to be taken from the PAW allocation of 480,000 bbl. per day for consumption in District 2.

Telegrams were sent to all refiners assigning quotas for the additional shipments.

Closer Control Ordered Over Railroad Fuel Oil

WASHINGTON, D. C. — Closer supervision over deliveries of fuel oil to railroads in the Middle West has been directed of the PAW offices in Districts 2 and 3 by the Petroleum Administration for War.

Control methods will be worked out locally, but must conform to certain standards, including: Elimination of crosshauling and unnecessary movements; equitable distribution of available supplies among railroads, considering such factors as stocks on hand, ODT recommendations, storage facilities, and ability to handle promptly; equitable distribution among refiners of the obligation to supply railroads and maintenance of customary arrangements to the extent permitted by efficiency of transportation and maximum production of war products; and no discrimination in price or quality unless counterbalanced by more efficient use of transportation.

Fred F. Murray Heads Oil Well Supply Co.

DALLAS, Tex.—Fred F. Murray has been elected president of Oil Well Supply Co., to succeed Benjamin F. Harris, of Pittsburgh, Pa., who resigned some months ago. This is the first time the presidency of the company, which is a subsidiary of United States Steel Corp., has come to the Southwest.

Mr. Murray is a native of Kansas City, Mo. He received his degree in mechanical engineering from Stevens Institute of Technology in 1918.

In 1929 he became associated with Wilson-Snyder Manufacturing Co., of Pittsburgh. In the same year Oil Well Supply Co. acquired Wilson-Snyder, and Mr. Murray acted as vice president of both companies. In 1930, Oil Well Supply Co. became a United States Steel Corp. subsidiary, and Mr. Murray moved to Oil City, Pa., to be in charge of all manufacturing operations. In January 1934 he moved to Pittsburgh as ranking vice president, where he remained until his transfer to Dallas in 1936, to which point the headquarters of the company had been moved in 1932.

In 1934 he was married to Miss Dorothy Schraft, of East Orange, N. J. They have two daughters and a son.

Mr. Murray is president of the Petroleum Equipment Suppliers Association, a director of the American Petroleum Institute and a director of the Texas Mid-Continent Oil and Gas Association. He is a member of the Dallas Petroleum Club, the American Society of Mechanical Engineers, and the American Institute of Mining and Metallurgical Engineers.

FRED F. MURRAY

Federal Order Digest

PRICE ORDERS

Fuel Oil—RO 11, Amendment 75: Permits certain commercial, industrial and governmental consumers of fuel oil to obtain emergency reserves to assure uninterrupted operation of public utilities and manufacturing plants, effective August 20.

Fuel Oil—RPS 88, Amendment 123: Provides for adjustment of subnormal tank-wagon prices in 11 Middle West states, to the level of reference suppliers, effective September 1.

Fuel Oil—RPS 88, Amendment 124: Broadens the existing provisions on adjustable pricing, permitting buyers and sellers to agree that maximum prices pending disposition of petitions will be in accordance with the decision, effective September 2.

Camelback — RO 1A, Amendment 47: Broadens rationing eligibility rules to provide recapping services and new tubes upon certificate for all commercial vehicles, regardless of the use to which they are put, effective September 2.

Camelback — RO 1A, Amendment 48: Removes restrictions on the use of Grade C camelback in recapping service, effective August 25.

Tires and Tubes—RPS 63, Amendment 13: Specifies maximum retail prices for additional sizes of a few brands of truck tires and tubes of eight brand-owning companies, effective September 2.

WPB REGULATIONS

Controlled Materials—CMP 1, Interpretation 14: Clarifies use of the quarterly identification symbol in connection with the placement of orders under CMP procedure, eliminating necessity of placing quarterly identification on orders for Class B products, retained on other classes, issued August 23.

Public Utilities—U-1-F: Eliminates vast amount of paper work by simplifying the system by which applications for extensions of utility services involving small amounts of materials are handled, issued August 24.

WPB Forms—PR 5, amended: Simplifies general rules governing the reproduction of WPB forms and orders, issued August 23.

Petroleum Supplies — Creates new section within Wholesale and Retail Trade Division for exclusive handling of problems of petroleum equipment distributors, headed by Myron C. Schoenly, previously distribution officer assigned to PAW, announced August 23.

Petroleum Equipment—PRO P-98-c, amended: Permits sale by one operator of both used and new equipment to a supplier as intermediary previous to its resale to another operator, issued August 24.

TRANSPORTATION ORDERS

Tank Cars—Special Direction ODT 7, Revised-2: Halts movements of commodities in tank cars in violation of the spirit of the order which requires capacity loading of tank cars unless otherwise authorized by permit, issued August 25.

Expedited Trains—ICC Service Order 150: Stops operation of special expedited freight trains which take precedence over regular traffic, excepting petroleum "symbol" trains, issued August 27.

NWLB RULING

Petroleum Commissions: Authorizes average increase of 4.6 per cent in commission rates for approximately 3,700 Standard Oil Co. (Indiana) bulk-station agents and drivers engaged in selling and distributing petroleum products to service stations, resellers and consumers in 22 midwestern cities.

DEATHS

Francis Marion Long, 52, veteran oil-drilling firm head, died last week at his home in Humble, Tex. Spending nearly a third of a century in various oil-industry activities, he operated independently for several years in the Gulf Coast, East and Central Texas fields. In recent years he sold his producing interests and confined his activities to contract drilling. Until a few months before his death, he was head of F. M. Long Drilling Co.

John A. Champion, 93, who was once named as the "grand old man" of the oil industry, died in Tulsa, death being caused by complications of old age. Mr. Champion had been in the oil industry most of his life, serving as lease foreman in his later years. He became associated with Deep Rock Oil Co. in 1921. He retired 12 years ago.

Albert L. Gustin, Sr., president of the Gustin-Bacon Manufacturing Co., died at his home in Kansas City, Mo., following a heart attack. He had been president of the company since its organization in 1898.

Arthur Little, 54, district superintendent in the marketing division of Cities Service Oil Co., died of a heart attack at his vacation home near Hulbert, Okla. Mr. Little, whose home was in Bartlesville, Okla., had been associated with Cities Service for 27 years.

R. Gurly Bebbington, 62, superintendent of the Kansas City refinery of Sinclair Refining Co., died of a heart attack in Kansas City, last week. He had been superintendent of the plant for 21 years. He started his career with Chanute Refining Co., Chanute, Kans.

Frank Neely, 70, retired Tulsa oil man, died last week in a Tulsa hospital, following an illness of 2 weeks. A Pennsylvanian by birth, he followed oil development westward and developed holdings in Kansas and Oklahoma. He was president of Superior Oil Corp., in charge of production, remaining in that capacity until his retirement 2 years ago.

Albion James Wadhams, 68, vice president and manager of development and research division of International Nickel Co., died at his summer home at Elizabethtown, N. J., August 22, of a heart attack. He had been with International Nickel and its predecessor companies since 1901.

H. C. O'Neill, 76, a retired oil man, died August 25 at his home in Tulsa.

John William Wade, 64, who had been employed at the refinery of Mid-Continent Petroleum Co. for 25 years, died in a Tulsa hospital August 25, after an illness of 10 days. A native of Rogers, Ark., he came to Tulsa in 1907.

Leslie Dow Sandefur, 54, pioneer oil driller, died at Palestine, Tex., after a brief illness from a stroke of paralysis. A native of Kentucky, he worked as a driller for the old Dutch Shell interests in Borneo, Sumatra, and other East Indies islands just prior to the war.

Frank C. Henderson, 85, veteran of the oil industry, passed away at Hot Springs, Va., August 26. Mr. Henderson was at Beaumont, Tex., when Anthony F. Lucas completed the first Spindletop well and has been in the industry continuously from that time. He was one of the early-day producers in the Nowata area of Northeast Oklahoma, afterwards building the first large casinghead-gasoline plant in the Mid-Continent area at Nowata. Later, he expanded his operations into Texas, Arkansas and Louisiana. For the last 15 years, he has operated a gasoline plant at Sanford, in the Texas Panhandle, and in 1939 built the first high-pressure recycling plant on the Gulf Coast in the Agua Dulce field. Up until the time of his passing, Mr. Henderson remained active in the management of his business.

Cracking Technology—No. 1

Reactions in Cracking Process

*by C. R. Wagner**

Cracking petroleum oils, as practiced in the modern refinery, is a highly complex process, and many of the details of the reactions are not well understood; simplified reactions which show the primary and final components of a reaction are used to show the results obtained. The cracking rate appears to be doubled for each 18° F. to 30-35° F. rise in cracking temperature, the rate depending on stock, temperature range, degree of decomposition and other factors.

BENJAMIN SILLIMAN[1] in 1855 was apparently the first to conceive the idea of thermally decomposing the heavier fractions of crude petroleum to produce desirable lighter products. Earlier workers had gasified petroleum in the manufacture of illuminating gas, and much earlier Dalton[2] and Faraday[3] had experimented on the high-temperature conversion of hydrocarbon gases. Silliman's paper was not published until 1871, and in the meantime the industry had developed the technique of converting the heavier portions of the crude petroleum into kerosene. The experimental work of Thorpe and Young[4] and of Berthelot[5] had also been published.

There was no need to produce gasoline fractions by cracking heavier products prior to the first decade of the twentieth century, because there was more gasoline in the crude petroleum refined than could be marketed. Stoves, lamps and a few stationary gasoline engines could not consume the quantities available and many thousand barrels were burned in open pits or furtively poured into rivers and lakes. The development of the automobile quickly changed the picture, however, and beginning with 1906 we find the literature—particularly patent literature—full of references to processes for making gasoline or motor fuel. During the first World War an acute shortage of gasoline occurred along with a diminution in the discovery of new sources of crude petroleum. The U. S. Geological Survey predicted the early exhaustion of our petroleum reserves and everyone was frantically endeavoring to squeeze the last possible drop of gasoline from every barrel of crude oil. It was a situation that could, and did, set off a tremendous research program in the field of cracking—or pyrolysis of hydrocarbons. (Except for the difference in dates and a few names the above might be said as appropriately about the present petroleum situation.)

An excellent resume of the literature up to 1916 is given in Bureau of Mines Bulletin 114[6] and in an article by Lomax, Dustan and Thole.[7]

A recent compilation of the patent literature which fills a 600-page book has been made by McKnight.[8] Since 1925 the technical literature on this subject has been quite voluminous.[9,10]

The first commercially successful cracking processes were distinctly liquid-phase processes—Burton, Coast, Dubbs, Cross, Holmes-Manley, Fleming, Lewis, etc. Cracking took place under pressure at temperatures between 700° and 850° F. and in several of them the gasoline was distilled from the hot oil as it was formed. During the period 1916-1920 the Hall and Rittman processes were also able to operate commercially, but the increasing production of crude petroleum in the early 1920's lowered gasoline prices to such an extent that these vapor-phase processes were abandoned.

With the raising of compression ratios of automobiles, gasoline antiknock value had to be increased, and the development of vapor-phase cracking was resumed. The application of shock-chilling of cracked vapors to a temperature below the coking point made vapor-phase cracking at high temperatures a successful commercial practice. By the addition of this quenching technique it became possible to raise the cracking temperatures above the critical point in other processes which had been operating below the critical temperature. In this way they produced higher antiknock-value gasoline and were not forced to lose capacity by dropping pressures.

As the octane number of marketable gasoline increased, a point was reached where the low octane number of the straightrun gasoline prevented further increases in total gasoline octane number by simple blending with cracked gasoline. In the late twenties and early thirties refiners therefore began to separate the straightrun fraction into a high octane number light end and a low octane number heavy end. The heavy end was then "reformed" by cracking it at temperatures in the range of 985° to 1,050° F. under pressures of 400 to 1,000 lb. per sq. in. This practice was soon followed by the development of the catalytic cracking of gas oil and the catalytic reforming of naphtha as means to the same end, i.e., raising the octane number of the total gasoline produced from the crude petroleum before adding tetraethyl lead.

Cracking as it is practiced commercially is an extremely complex process. The charging stock to the process is an indescribable mixture which contains compounds as light as heavy

*Consultant in refining technology.

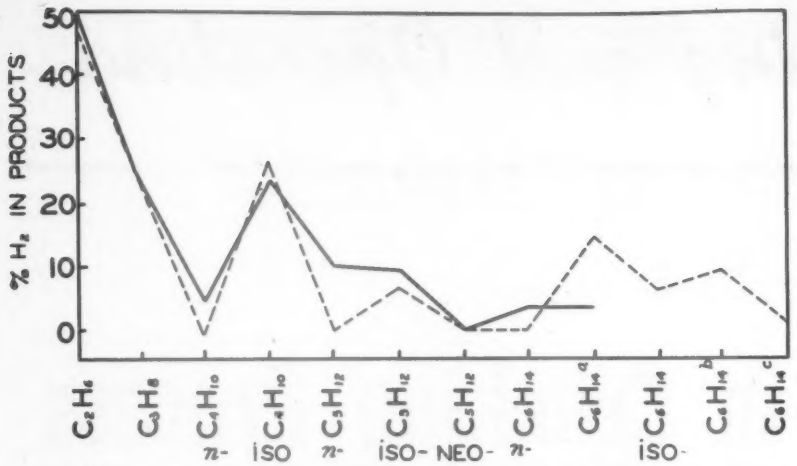


Fig. 1—Observed (solid line) and calculated (dotted line) hydrogen production in the thermal decomposition of hydrocarbons. C_6H_{14} isomers: [a]2,3-Dimethylbutane. [b]2,2-Dimethylbutane. [c]3-Ethylpentane

gasoline—and sometimes as light as ethane and ethylene—on the one hand and as heavy as the highest-boiling-range fractions of the crude petroleum on the other. The hydrogen content of these compounds varies from that of the simple paraffins to that of olefins, naphthenes, aromatics and polynuclear compounds whose structures are only vaguely conjectured. Under such circumstances it must be apparent that positive statements concerning the mechanism of the cracking reaction should not be taken too literally. At the temperatures now employed it is certain that secondary reactions on the part of the primary reaction products, as well as molecular rearrangements and polymerization reactions, must occur.

If we consider the possible reactions of ethane when subjected to high temperature, we find there are several things that may occur, and, as time for secondary reactions is given, still others appear possible.

$$C_2H_6 \rightarrow CH_3- + CH_3- \quad (1)$$

$$C_2H_6 \rightarrow CH_3 \cdot CH_2 + H- \quad (2)$$

$$C_2H_6 \rightarrow C_2H_4 + H_2 \quad (3)$$

$$C_2H_6 \rightarrow CH_4 + C + H_2 \quad (4)$$

$$2C_2H_6 \rightarrow CH_4 + C_3H_8 \quad (5)$$

Since the carbon-to-carbon bond is weaker than the carbon-to-hydrogen bond, it would be predicted that (1) would occur to a greater extent than (2). One the other hand, it is to be expected that these methyl radicals would react with ethane molecules, since the probability of a collision with an ethane molecule is many times as great as any other type of collision.

$$C_2H_6 + CH_3- \rightarrow CH_3 \cdot CH_2- + CH_4 \quad (6)$$

$$CH_3 \cdot CH_2- \rightarrow C_2H_4 + H- \quad (7)$$

$$C_2H_6 + H- \rightarrow CH_3 \cdot CH_2- + H_2 \quad (8)$$

The probability that (3) is a primary reaction is therefore slight according to this theory of radical formation.[11] By means of a chain reaction involving a sequence of (1), (6), (7) and (8) it would be possible to form an indefinite quantity of C_2H_4 and H_2 beginning with a single C-C splitting of an ethane molecule. The chain would be interrupted when a collision occurred between H- and any other radical, as H-, CH_3-, or $CH_3 \cdot CH_2$-.

The formation of CH_4 is much more easily accounted for by this theory than by (4). Propane and butane formation could easily be explained by (9) and (10) and the probability of these reactions can be calculated mathematically.[11]

$$CH_3 \cdot CH_2- + CH_3- \rightarrow C_3H_8 \quad (9)$$

$$CH_3 \cdot CH_2- + CH_3 \cdot CH_2- \rightarrow C_4H_{10} \quad (10)$$

Fig. 1 compares the measured results of such pyrolysis experiments with the calculated values.[12]

In the cracking of propane a similar series of reactions would seem possible.

$$C_3H_8 \rightarrow CH_3- + CH_3 \cdot CH_2- \quad (11)$$

$$CH_3 \cdot CH_2- \rightarrow C_2H_4 + H- \quad (12)$$

$$CH_3- + H- \rightarrow CH_4 \quad (13)$$

$$CH_2 \cdot CH_2- + H- \rightarrow C_2H_6 \quad (14)$$

$$CH_3- + CH_3- \rightarrow C_2H_6 \quad (15)$$

$$C_3H_8 + CH_3- \rightarrow CH_3 \cdot CH_2 \cdot CH_2- + CH_4 \quad (16)$$

$$CH_3 \cdot CH_2 \cdot CH_2- \rightarrow C_3H_6 + H- \quad (17)$$

$$C_3H_8 + CH_3 \cdot CH_2- \rightarrow CH_3 \cdot CH_2 \cdot CH_2- + C_2H_6 \quad (18)$$

$$C_3H_8 + H- \rightarrow CH_3 \cdot CH_2 \cdot CH_2- + H_2 \quad (19)$$

As a matter of fact propane does yield propylene, ethylene, hydrogen, methane, ethane and some higher hydrocarbons as would be expected from such a reaction mechanism. The existence of the methyl radical in these cracking reactions has been proved by passing the reaction products over metallic mirrors. The methyl radicals react with the metal to form methyl derivatives. Evidence regarding the higher radicals is not so conclusive. Their possible life is so short that failure to find them is not surprising. The use of spectroscopic methods may be more successful in such studies, since it should be possible in this manner to follow the progress of the reaction directly.

When we consider the possible reactions of normal butane, it becomes evident that the situation is still more complex. Scission of the carbon-to-

(Continued on page 54)

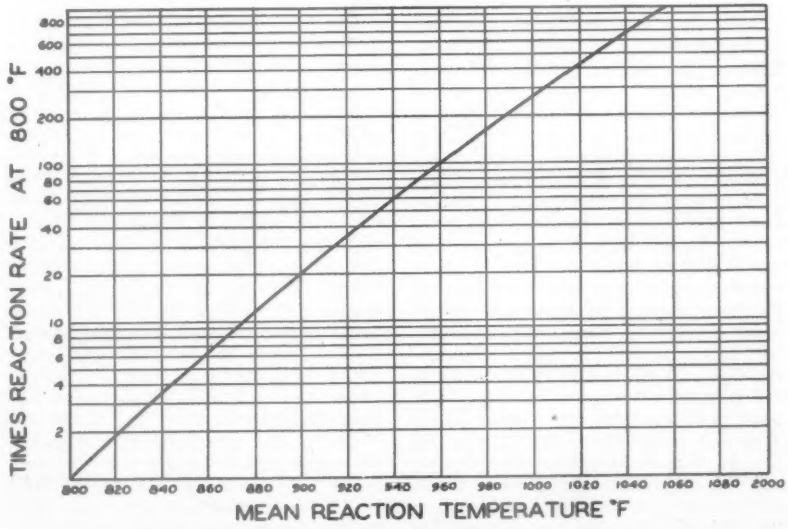


Fig. 2—Effect of temperature upon the rate of cracking

High-Pressure Corrosion Controlled by Chemicals

by Harry F. Simons

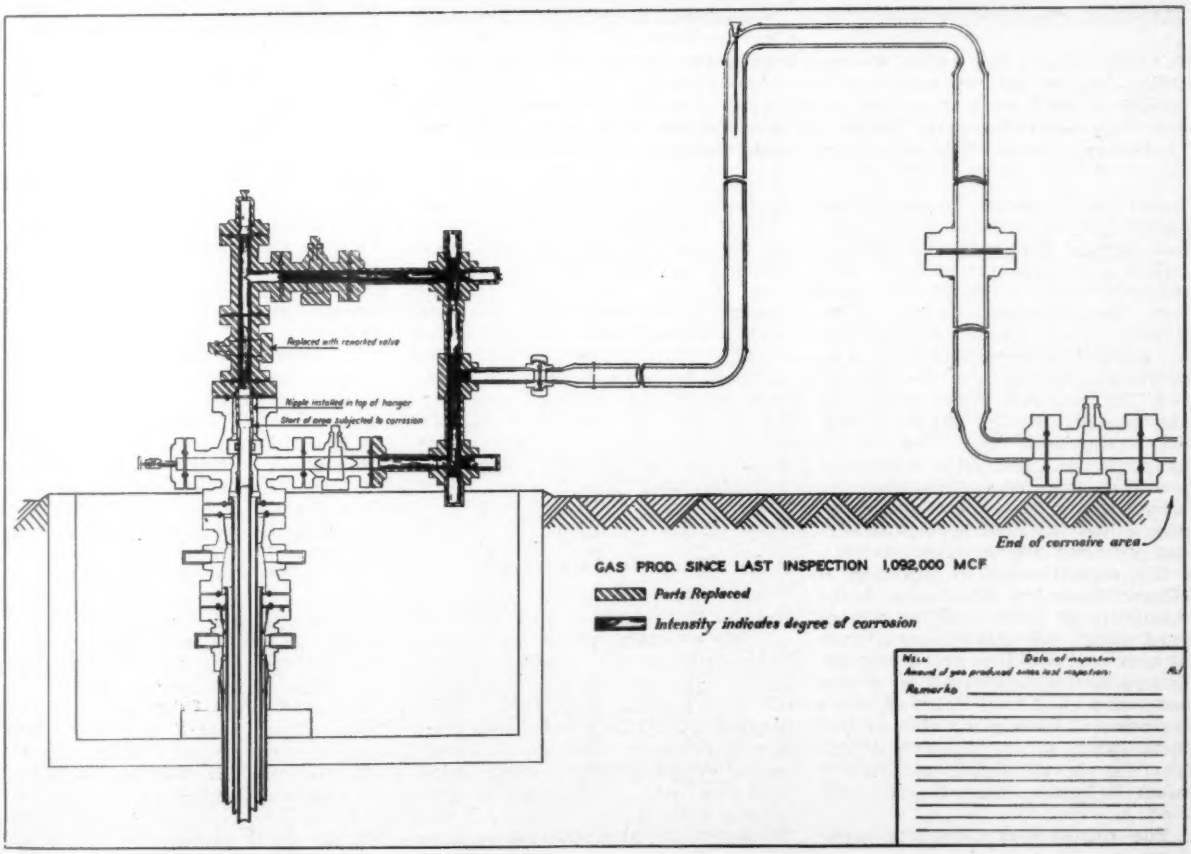
An unusual type of corrosion is being experienced in some of the wells at Opelika, a high-pressure distillate pool in Henderson County, Texas. The corrosion is severe and occurs in the christmas trees and surface connections to a point just beyond the line valve. Corrective measures have been inaugurated while the fundamental causes are being sought. The corrosion is being controlled by the injection of chemicals into the wells.

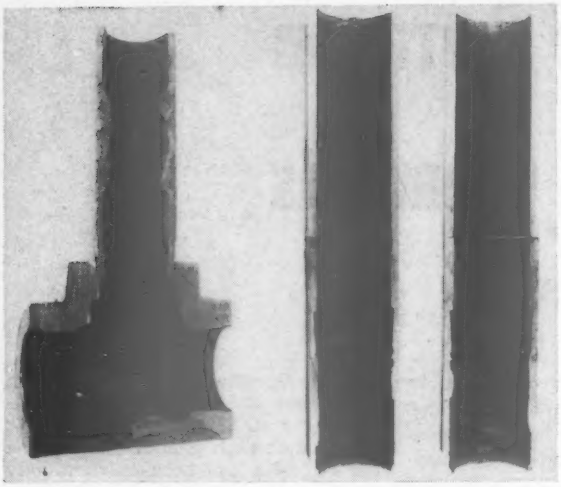
CORROSION in oil and gas wells is not uncommon, and often it is difficult to establish the exact cause preparatory to taking steps to stop the damage to equipment. At Opelika, Henderson County, Texas, a distillate-producing field which is being recycled, a type of corrosion new both as to form and occurrence has been encountered. At present it is being controlled by the injection of chemicals into the wells affected although as yet the source and action have not been completely determined. The seriousness of the corrosion problem at Opelika was discovered in September of last year.*

Being a distillate pool, Opelika is operated at high pressure, and while the corrosion has been outstandingly severe there similar conditions have been noted in other distillate pools. It is possible that a peculiarly vicious type of internal corrosion of equipment may accompany high-pressure gas and distillate production. The corrosion trouble at Opelika is concen-

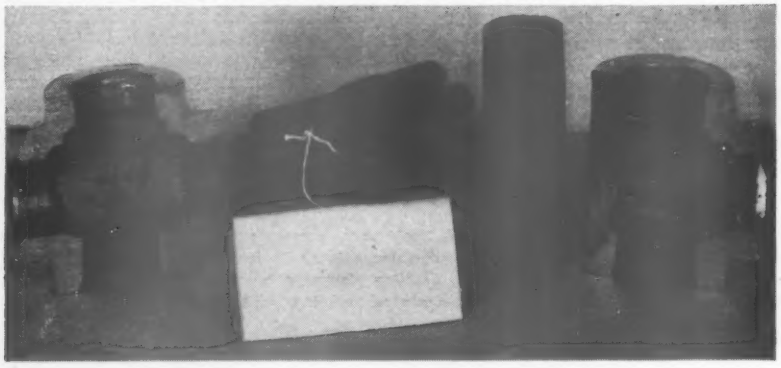
*Bacon, T. S., and Brown, E. A., "Corrosion in Distillate Wells," N.G.A.A., Dallas, Tex., April 1943.

Fig. 1—Diagram of well-head and surface connections on well at Opelika, Tex., distillate pool. Corrosive area starts at tubing hanger and ends just beyond union to meter run in this particular well. On some wells corrosion extends to just beyond the line valve at the extreme right. Crosshatched connections are those replaced at last inspection. Shading shows presence of corrosion and shading intensity shows degree. In keeping record of corrosion each part is numbered and its condition described


Replaced with reworked valve
Nipple installed in top of hanger
Start of area subjected to corrosion
End of corrosive area
GAS PROD. SINCE LAST INSPECTION 1,092,000 MCF
Parts Replaced
Intensity indicates degree of corrosion
Well
Date of inspection
Amount of gas produced since last inspection:
Remarks



Left: Corrosion specimens cut in half for inspection. Tee and nipple removed from service on well at Opelika because of corroded condition. Note over half of body metal of 2-in. nipple has been removed and threads have been attacked. Dark space on lower part of tee is where it was etched to determine effect on structure of metal. At the right are two halves of 3-in. pipe cut longitudinally to show internal corrosion. Direction of flow is upward. The upper two-thirds of the pipe are unaffected while lower third is badly corroded. Concentration of corrosion to develop the ring is typical in straight pipe sections following a turn or restriction. Mill scale still present in lower portion of the specimen while metal beneath has been removed and honeycombed. Below: Inspection after 60 days' service at Opelika shows corrosion of deepest threads in this 2-in. tee. Damage is not enough to cause removal from service



Corroded specimens from Opelika, Tex. Left: Cross with threads and body badly corroded although in a few spots in center the original thickness remains. Second from left: Tubes installed in meter run to direct flow against plate; all are badly corroded and some have walls completely removed. Second from right: Two-inch nipple badly corroded over its entire length. Right: Tee showing marked corrosion of threads and body

trated in the christmas-tree fittings and in surface connections to a point just beyond the line valve. Tubing pulled from one well showed only slight corrosion on the bottom of each joint, the gathering lines to the distillate-recovery plant are apparently not seriously affected and there is no appreciable corrosion in the plant itself. The corrosion is not continuous and consistent throughout the fittings and connections from the tubing hanger to line valve but is much more severe at some points than others. In some cases it is so rapid that new connections installed have been condemned after only 90 days' service.

The concentration of corrosion at comparatively few points presents the possibility of rupture of the fittings even though the total amount of metal removed would be practically unnoticeable if distributed over several hundred feet of line. However, when the removal takes place over an area measured in square inches, a serious situation is presented, particularly when high pressures are being handled.

The corrosion at Opelika generally (although not always) occurs and is most severe at points of turbulence as the distillate-carrying gas passes through the christmas tree and surface fittings. Tees, ells, crosses, flanges, valves and orifices are seriously affected while straight pieces of pipe are affected only at points adjacent to other fittings. A nipple may be seriously corroded at the upstream end and unaffected throughout the remainder of its length. Any restriction, increase or reduction in velocity of the stream, or any turbulence, seems to aid in the creation of the corrosive condition.

Body Metal Destroyed

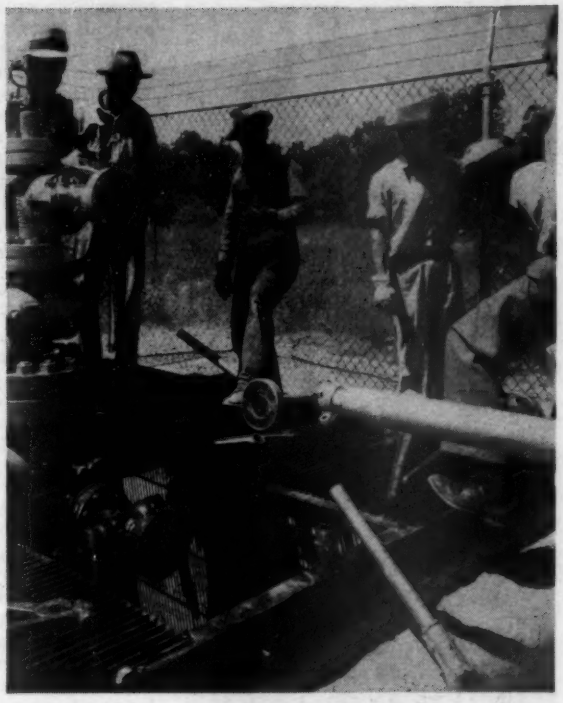
The body metal of the fittings and valves is destroyed and removed, leaving a rough, pitted appearance. Frequently in the straight tubular parts of the trees the corrosion takes the form of a ring around the interior located a distance downstream from a restriction or bend approximately equal to the diameter of the pipe. The ring may or may not be completely around the internal circumference of the pipe and in some cases the mill scale may still be present while the metal beneath is honeycombed and eaten away. In some cases in the straight sections of pipe, secondary and tertiary corrosion rings of less seriousness occur at distances equaling approximately two and three diameters of the pipe. The width of the corrosion rings does not seem to be as well correlated as the location although the width is quite often a little less than the tube diameter.

It is extremely difficult to establish whether one side or the top or bottom of the fittings is subjected to most corrosion although on the line valves, which are the farthest down stream, the corrosion is the severest on the bottom where water, or fluid, would collect. Practically no corrosion has been found more than a few feet beyond the line valve.

Of the 12 producing wells (there is also an input well) owned by Lone Star Producing Co. in the field, nine exhibit corrosion and three, which are operated at practically identical pressures, temperatures and with identical fittings, show no corrosion. Two of the corrosive producing wells have recently been shut in, due to a drop in distillate content caused by migration of injected gas. Production is from the upper Glen Rose at an average depth of 8,300 ft.; the struc-

Left: Flange face of 2-in. high-pressure valve shows evidence of corrosion after 60 days' service

Right: Examination of christmas tree. From left to right: Carl Flanders, Dowell Incorporated; Hayden Irvin and Ted Scott, utility men; E. A. Brown, chief production engineer; Ed Wolfe, Opelika district production engineer; and T. S. Bacon, research engineer, Lone Star Producing Co.



ture is an anticline. There are two gathering systems in the field, one operating at 2,300 to 2,500 lb. per sq. in. and the other at 800 to 1,200 lb. per sq. in. The wells operating at the lower pressure originally operated at the higher pressure and while being so produced showed the severest corrosion. The three low-pressure wells have not been operated long enough under present conditions to tell if the corrosion is limited strictly to operation under high pressures.

All of the wells have a productivity index in excess of the volume which could be handled by the tubing and the average production is between 6,000,000 and 8,000,000 cu. ft. per well per day. Shut-in pressure of the wells is around 3,000 lb. per sq. in. and bottom-hole pressure is around 3,800 lb. per sq. in. Bottom-hole temperature is around 235° F. and surface temperature ranges from 140° to 180° F. Water content of the gas taken from the intake separators at the plant is approximately 1 bbl. to 1,000,000 cu. ft. of gas. This water is acidic with a pH of about 5.8.

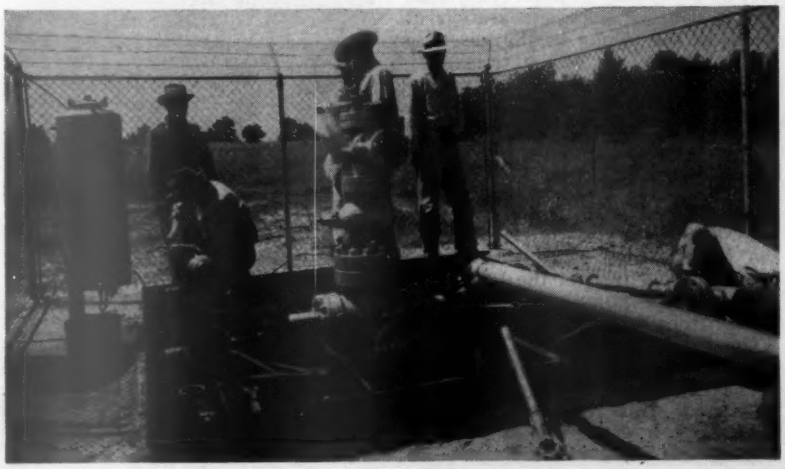
Analysis of water obtained from the well heads of four wells is shown in the accompanying table. The one showing the greatest chloride content and the greatest total of dissolved solids was from a well showing the least corrosion trouble of the four. Analysis of the gas produced showed a hydrogen-sulfide content of 0.1 g. per 100 cu. ft. and a carbon dioxide content of 1 to 2 per cent by volume. Stray-current surveys show very small currents running toward the wells.

The wells are equipped with 10,000-lb. test forged or cast-steel connections and fittings which have a wall thickness of ½ to ¾ in. Pipe used in the gathering system is equally heavy. All the wells are produced through tubing with a high-pressure tubing hanger and the standard christmas-tree design shown in Fig. 1. Cast-steel fittings and connections seem to be more susceptible to corrosion than the forged-steel ones.

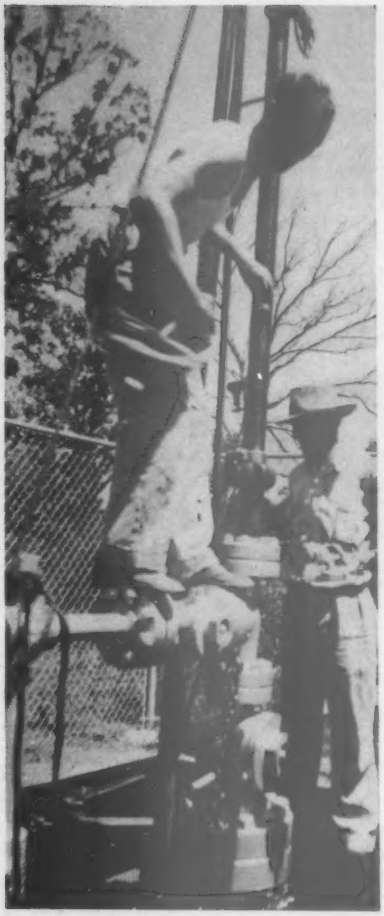
TABLE I
Analysis of Well-Head Water From Four Wells at Opelika

	Well (parts per million)			
	A	B	C	D
Total dissolved solids	560	843	1,231	1,585
Silica	2	0	0	0
Iron	22.9	20	20	37
Calcium	115	165	255	326
Magnesium	16	12	7	16
Sulfates	8	14	0	8
Chlorides	266	447	643	834
Carbonates	0	0	0	0
Bicarbonates	49	18	21	46
Hardness	500 plus	500 plus	500 plus	500 plus
Causticity	0	0	0	0
Alkalinity	40	15	17	38

Inspection of well-head fittings at Opelika. Man behind christmas tree holds corrosion record sheet while one at right examines interior of drop and describes its condition. Chemical pump at left forces treating fluid into annular space



Despite the absence of identifiable corrosive compounds, the appearance of the corroded parts and their location leads to the belief that it is due to direct chemical attack aggravated or concentrated by physical conditions. It may be due to instantaneous but continuous formation of water containing corrosive elements at the points affected. After the internal surface has been destroyed the moisture is more readily retained and the corrosion speeds up. What part turbulence, stream-velocity changes and pressure drops in the christmas tree play is hard to determine. The latter, while appreciable, would not be great, the drop from tubing hanger to beyond the line valve not being



Preparing to remove bottom-hole bomb from lubricator after run to get sample of bottom-hole water. This particular well is one of three at Opelika showing no corrosion trouble and hence is not being treated

much over 50 lb. per sq. in. at maximum flow rates.

Preventive Measures

Preventive measures consist at present of injecting chemical into the wells so that it travels down the annular space and back through the tubing. The chemical mixture used consists of soda ash containing sodium hexametaphosphate as its principal ingredient and a commercial inhibitor commonly used for protection of steel equipment. The soda ash, being strongly basic, corrects the pH value, the object of the hexametaphosphate is to prevent precipitation of calcium carbonate at the formation and the inhibitor counteracts, or at least reduces, the action of acids or acidic waters on the steel. The amount of soda ash to use was determined quantitatively so as to raise the pH of the produced water to 6 to 6.5 range. The chemical solution is prepared at the plant with all ingredients being carefully weighed to insure that proper concentrations are obtained. The completed solution of proper concentration is then hauled by tank truck to the individual wells where the required amounts of solution are delivered to storage tanks. The injection pumps take suction directly from these tanks.

The original attempt at controlling the corrosion at Opelika consisted of injecting approximately 1 lb. of soda ash (dissolved in 2 gal. of water) per barrel of produced water. This raised the pH of produced water to between 7.0 and 8.0 and reduced the iron content of the well-head water from 150-300 p.p.m. to 5-30 p.p.m. This treatment was tried on one well, was apparently a success and was extended to other wells. After about 30 days the production of the wells diminished and one shut off entirely. The wells were easily rejuvenated by a down-hole application of 4 bbl. per well of hydrochloric acid. The change to the present chemical mixture was made to prevent this plugging of the wells.

The treatment appears to have reduced the corrosion appreciably although a quantitative evaluation is extremely difficult. The well fittings and connections are examined at regular intervals and the extent of corrosion of each part listed. This is done by numbering each valve, fitting and connection on the well head and then describing its condition at the time of each inspection. Also diagrams (Fig. 1) of the well-head connections are used to record by colors the intensity of corrosion and the well-head fittings replaced at each inspection.

Analysis of Water

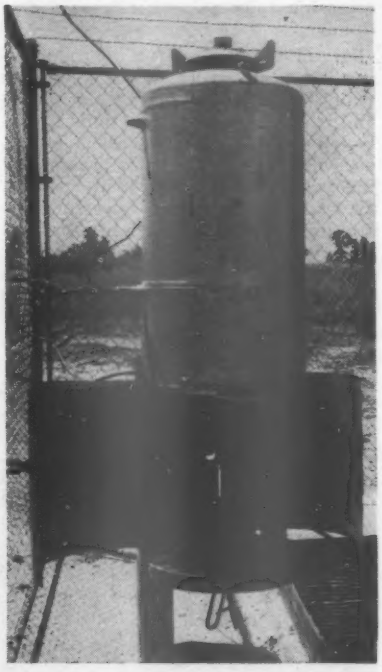
Analysis of water stripped from the gas at the inlet separators before it enters the high-pressure absorption plant is being continued as the iron content changes will show increase or decrease in total corrosion. Bottom-hole samples of water in the untreated wells (three wells show no corrosion and are not being treated chemically) are also being analyzed. These show some iron and considerable calcium content. By determining the total solids in the bottom-hole samples as compared with the well-head water samples the condensation of water in the tubing as the gas rises to the surface can be determined.

Injection of chemical into the annular space is by a high-pressure fluid-discharge pump operated by low-pressure gas. This is a commercial chemical pump for oil-field service remodeled slightly to fit the needs at Opelika. It consists of a pressure diaphragm directly connected to the fluid piston. The stroke is approximately 1 in. and the bore is ⅜ to ⅝ in. The pump operates at approximately 20 s.p.m.

Gas for the power end of the pump is taken from the tubing head at 2,300 to 2,500 lb. pressure and reduced to 40 lb. per sq. in. in an expansion chamber before it enters the diaphragm. During this pressure reduction considerable distillate is formed and this is bled off.

Better control of corrosion seems to be obtained in one well which apparently has a tubing leak comparatively near the surface. The chemical is bypassed into the flow stream without traveling to the bottom of the well and has a greater chance of being effective. Whether deliberate perforation of the tubing shortly below the surface would be a considerable aid is problematical.

The present treatment is producing results and the regular inspection indicates the corrosion is materially reduced. Inspection periods have been 30 days but are being increased to 60 days. There may still be precipitation of calcium carbinate at the formation due to the introduction of the soda ash but the acid treatment previously tried can be used to remove this deposition if it becomes troublesome. Complete solution of the problem will depend on the establishment of the corrosion cycle and the reason why the corrosive influences are present only in the well-head connections and not throughout the entire tubing strings and gathering system. This will require extensive work with control measures being used until a positive cure is developed.



High-pressure, small-volume pump used to place corrosion-control chemicals into well at Opelika. Pump cylinder, piston, suction and discharge valves are at bottom of open chamber. Diaphragm which operates pump is just above open doors and top part is reservoir for chemical mixture. Filters for straining chemical are obscured by doors. A volume chamber to the left acts as a scrubber to remove liquid before gas enters the power diaphragm

Consolidation of Gasoline Plants in Seminole a Conservation Step

by Arch L. Foster

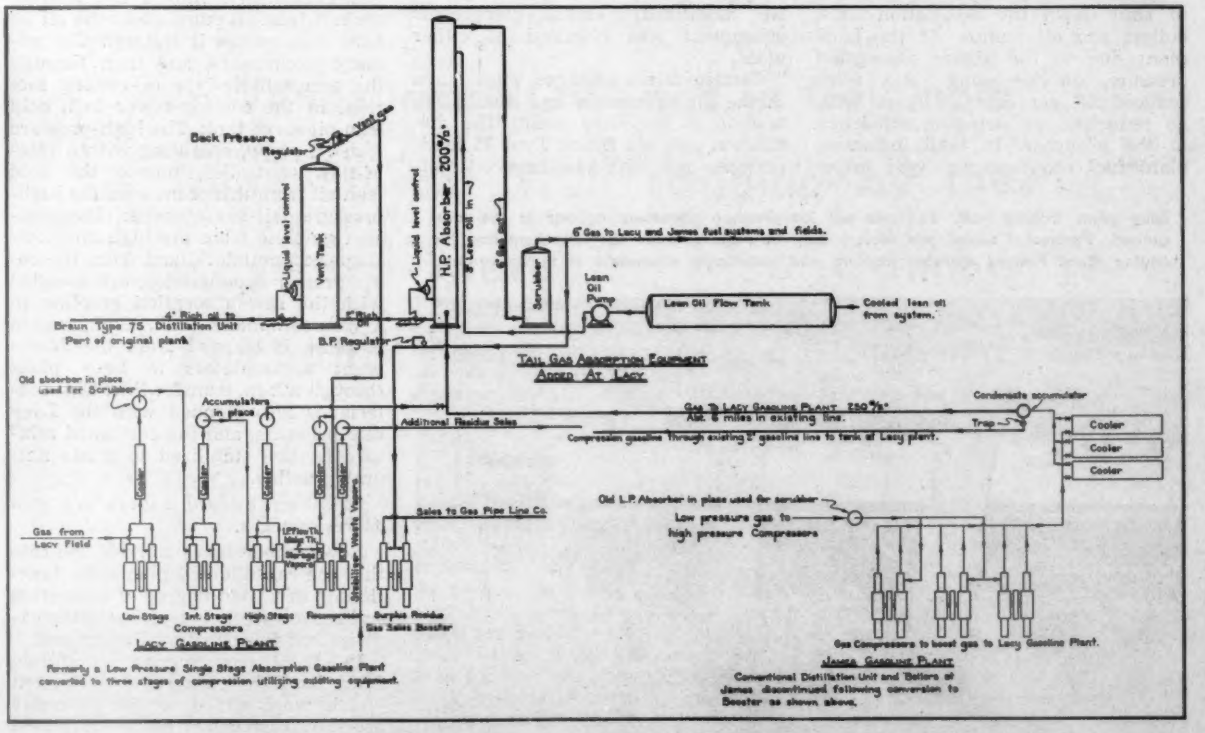
With gas supply Cities Service has combined the compression section of one Seminole gasoline plant with the absorption section of another plant. The move enabled the war-reduced staff to handle the job, reduced steam and power costs, gave much better efficiency, and released a large amount of equipment for other uses.

FOR some time Cities Service Oil Co. has been carefully studying the joint use of facilities in its natural-gasoline-plant operations. These studies were in response to a request of the Petroleum Administration for War that the industry conserve manpower and critical materials.

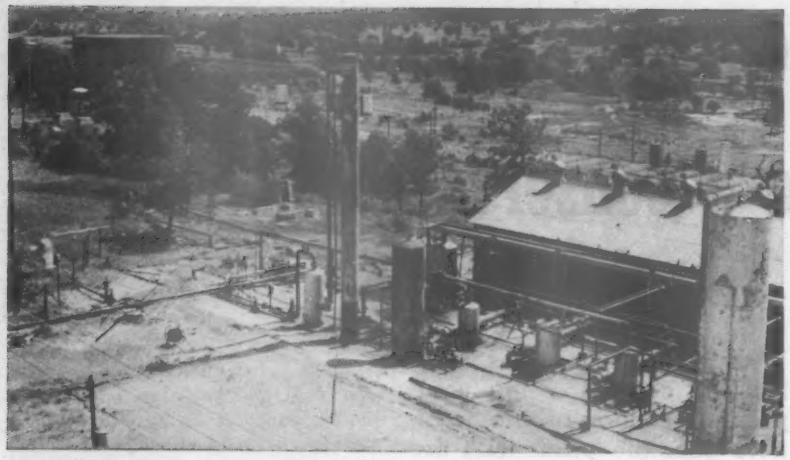
Where, in peace times, two or more plants or units would continue to operate independently for an indefinite time, ways and means were considered for combining operations of these plants to free personnel, supplies and equipment for other work, to conserve gas fuel, or for other reasons. Such activities are doing a great deal to meet the requirements for both equipment and personnel at a time when normal supplies of neither are available.

This study of joint use of facilities by Cities Service engineers revealed the advantages of combining the operations of the James and Lacy plants in the Seminole area of Oklahoma.

These plants were built in 1926 and 1927, respectively, and were designed for a daily capacity of 25,000 gal. each, when operating on the rich gas from the Seminole and Bowlegs fields. The design of the plants incorporated the low-pressure absorption method, or approximately 50-lb. gage absorber pressure. In addition, at the Lacy plant, several gas-engine compressors were installed in the original unit for gas-lift purposes. By the fall of 1942, available casinghead gas volumes had declined to a point where insufficient residue fuel gas remained, after gasoline extraction, to supply the fuel requirements of the plants and the field during the colder winter months. In order to conserve fuel gas, operating and maintenance supplies, and to meet the greatly reduced staff, the two plants were combined into one operation. Company officials point out that the consolidation of the two plants is an outstanding example of joint use of facilities which is accomplishing the conservation objectives outlined by PAW. It will also be observed in the following paragraphs that a considerable quantity of capital equipment has been made available for use elsewhere by reason of the new method of operating the plants.


Back Pressure Regulator
Vent Tank
Liquid level control
H.P. Absorber 200 lb.
Lean Oil in
Gas out
6" Gas to Lacy and James fuel systems and fields.
Scrubber
Lean Oil Pump
Lean Oil Flow Tank
Cooled lean oil from system.
4" Rich oil to Braun Type 75 Distillation Unit Part of original plant
4" Rich Oil
B.P. Regulator
TAIL GAS ABSORPTION EQUIPMENT ADDED AT LACY
Old absorber in place used for Scrubber
Accumulators in place
Additional Residue Sales
Gas to Lacy Gasoline Plant 250 lb. Abt. 6 miles in existing line.
Condensate accumulator
Trap
Compression gasoline through existing 2" gasoline line to tank at Lacy plant.
Cooler
Cooler
Cooler
Old L.P. Absorber in place used for scrubber
Low pressure gas to high pressure Compressors
Sales to Gas Pipe Line Co.
Gas from Lacy Field
Low Stage
Int. Stage Compressors
High Stage
Recompressor
Surplus Residue Gas Sales Booster
LACY GASOLINE PLANT
Formerly a Low Pressure Single Stage Absorption Gasoline Plant converted to three stages of compression utilizing existing equipment.
Gas Compressors to boost gas to Lacy Gasoline Plant.
JAMES GASOLINE PLANT
Conventional Distillation Unit and Boilers at James discontinued following conversion to Booster as shown above.

Flow diagram showing consolidation of Lacy and James gasoline plants in Seminole area



View showing the principal items of equipment added at Lacy plant for tail-gas absorption. From left to right appear the residue-gas scrubber, tail-gas absorber and high-pressure vent tank. The column at the extreme right is one of the old low-pressure absorbers, now used as a stage accumulator or drip

The James plant now operates entirely as a compression plant, with the tail gas being boosted to Lacy through 6 miles of existing idle line. The Lacy plant operates as a combination compression and high-pressure absorption plant. The James plant tail gas is received at Lacy and commingled with the tail gas from the Lacy compression system. The combined tail gases then enter a tail gas absorber at 200-lb. gage pressure without any additional boosting. Residue fuel gas is returned to James through an existing line.

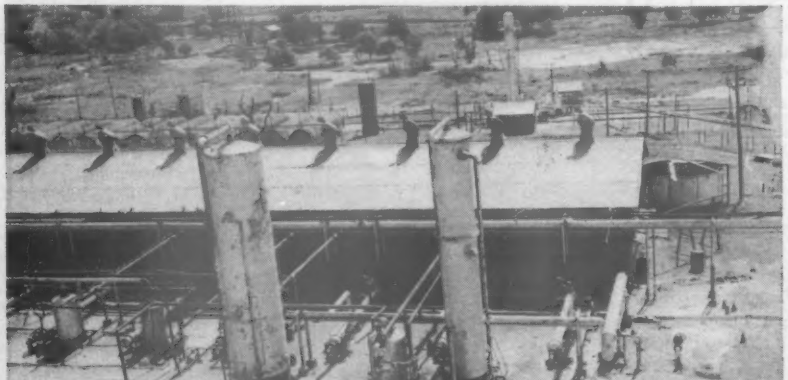
At the James plant, it was possible to shut down the distillation unit, boilers and oil pumps. At the Lacy plant due to the higher absorption pressure, oil-circulating rates were reduced 50 per cent or more with no reduction in stripping efficiency in the absorber. In both instances, plant fuel requirements were materially reduced through reduction in steam consumption.

With the consolidation in operation, a residue gas surplus has appeared in place of a shortage that existed for the past several years. Residue gas is now available for sale and one gas-engine compressor at Lacy plant is equipped to boost this excess gas from 200 lb. absorber pressure into a gas company's high-pressure line.

The consolidation of the two plants was effected with minimum cash outlay, inasmuch as existing equipment, and equipment reclaimed from other properties, was utilized throughout. No additional engine-compressor equipment was required at either plant.

Certain minor changes were made in the oil circulation and distillation hookup at the Lacy plant. The distillation unit is a Braun Type 75 semi-portable unit with additional oil-cooling coils and gasoline condensing coils of the atmospheric type located within a cooling tower nearby. With the reduced oil circulation, it was found that the atmospheric oil coils were of sufficient capacity to cool the oil without the aid of the closed oil coolers which form a part of the Braun unit. It was, therefore, decided to use these closed coolers as primary oil exchangers, which permitted shutting down a duplex steam water pump.

Lacy plant looking east. The two old low-pressure absorbers appear in the foreground. Horizontal closed gas coolers may be seen between the absorbers and the engine room. Part of storage, treating and stabilizing equipment is in background



The fat oil leaves the absorber at 200 lb. pressure and enters a Smith oil and gas separator at 100 lb. Light vapors flashed from this tank enter the intake of the high-stage compressors, and are recycled through the absorber, where the oil ratio is maintained at about 22 to 27 gal. per million cubic feet of gas. The fat oil then passes through the primary exchangers, mentioned above, and into a low-pressure fat-oil tank at approximately 65 lb. gage pressure. Vapors vented from the oil in this tank, enter the intake of the recompressor along with uncondensed vapors from the raw absorption accumulators, and weathered vapors from make tanks and storage. The fat oil then passes through the final bank of exchangers, a steam preheater, and into the still, where back pressure is maintained at 40 lb. gage. Gas-pressure drive is used throughout on the fat oil circuit, with liquid level controllers on the absorber and both vent tanks. This arrangement permitted shutting down the fat-oil steam pump. Lean oil from the still passes through the final, or hot exchangers, into a hot lean-oil tank. A lean-oil pump picks the oil up here and pumps it through the primary exchangers, and then through the atmospheric-type oil-cooling sections in the cooling tower to a cold lean-oil surge tank. The high-pressure lean-oil pump, operating with a rate-of-flow controller, pumps the cold lean oil from this point over the high-pressure tail-gas absorber. Compression gasoline from the high and low-stage accumulators, and from the recompressor accumulator, are blended with the raw absorption gasoline in a common make tank. Compression gasoline is trapped from the James plant accumulators to Lacy plant through a 2-in. transfer line. This material is also blended with the Lacy raw products, and the combined mixture is then stabilized to grade natural gasoline.

Stabilizer discard vapors are sold as residue gas.

Low-temperature analyses indicate that the consolidated plants are functioning at a high degree of extraction and recovery efficiency. Operating expense has been materially reduced.

In the accompanying simplified flow chart, the piping and equipment which were added to the assembly are shown by heavy lines; equipment already in place by light lines.

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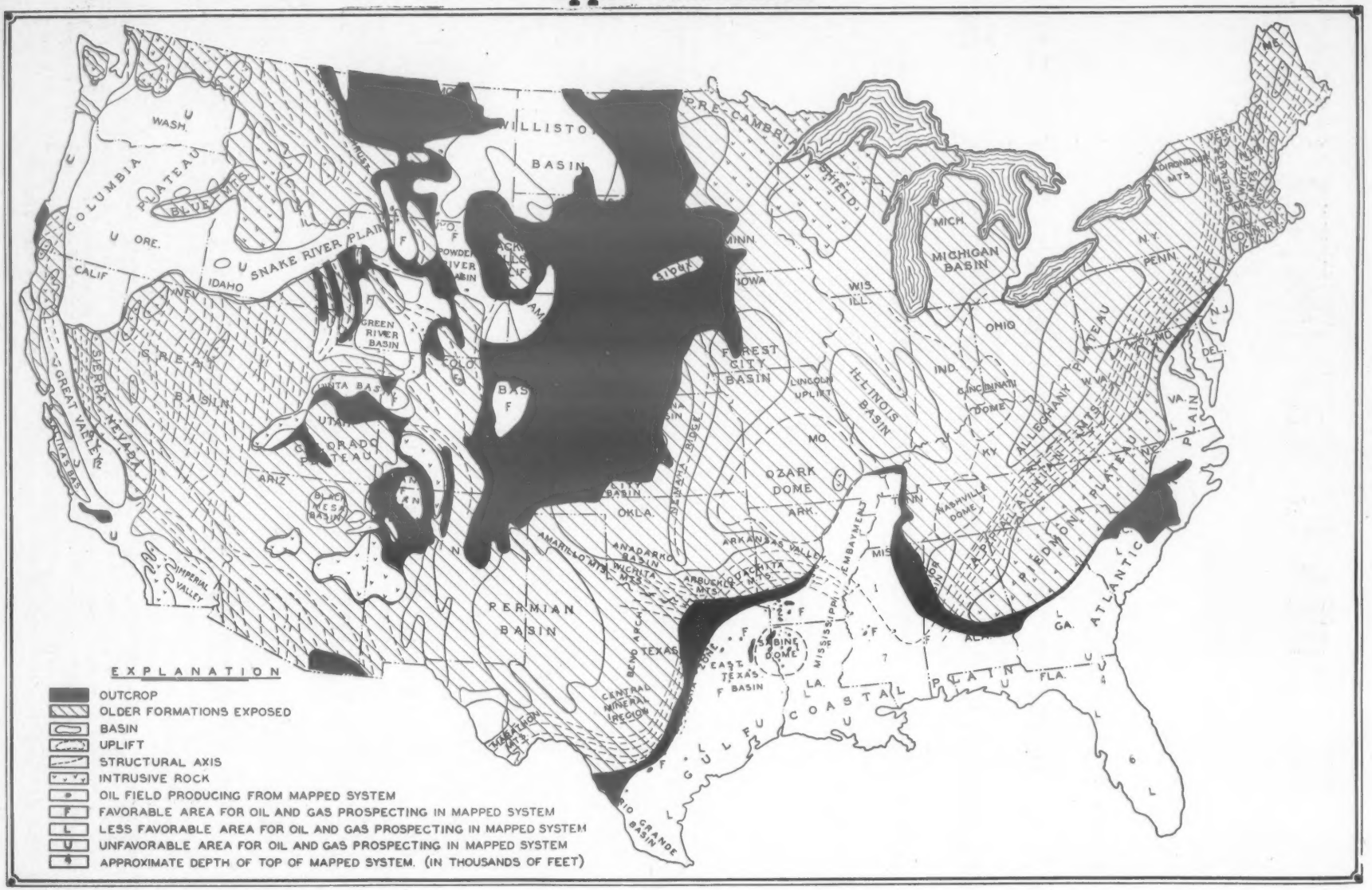
Upper Cretaceous



OIL ZONES OF THE UNITED STATES

Upper Cretaceous

(Compiled by The Oil and Gas Journal)

PRINCIPAL PRODUCING HORIZONS:

Sandstones: Woodbine, Tokio, Ozan, Buckrange, Blossom, Nacatoch in the East Texas basin and its extension into northern Louisiana and southern Arkansas; Tuscaloosa, Selma and Eutaw in Mississippi; Navarro in South Central Texas; Dakota, Muddy, Frontier, Wall Creek and Eagle in the Rocky Mountain area; Mesa Verde and Pictured Cliffs in Northwest New Mexico, and gas sands in the northern San Joaquin Valley district of California. Some of these horizons, particularly the Selma, and some of the East Texas pay horizons are sandy phases of limestone series.

Limestones (including chalk): Annona and Monroe gas rock in northern Louisiana, Dale and Austin in South Central Texas.

Serpentine in South Central Texas.

DISTRIBUTION OF PRODUCING AREAS: The Upper Cretaceous seas invaded the continent from the north, extending into Minnesota, Kansas and the Rocky Mountain states. Generally speaking, this embayment became continuously more restricted in size, the lowest formation, the **Dakota** sandstone occupying the greatest area. There was still a connection with the sea, however, in the western part of the area and some marine beds are found in this sector in the uppermost Cretaceous and in the early Eocene. The basins which lie between uplifted areas throughout this region, were thus areas of deposition, involving advances and retreats of the sea with the possible development of stratigraphic traps around the margins and of blanket sands on structure within the basins. The principal blanket sand is the Dakota but its oil possibilities are reduced by the fact that subsequent deformation and erosion has exposed large outcrops of this permeable sand at the surface and it has become largely filled with fresh water. It provides the principal source of artesian water in the Dakotas, Nebraska and Kansas, a fact which makes it an improbable reservoir in these areas. Following the deposition of the Mancos shale, the next sand of importance is the **Newcastle** or **Muddy.** This sand produces in fields around the Powder River and Green River basins and in Colorado. The **Frontier** formation produces farther north, being important around the Powder River and Big Horn basins. Sands found around the Powder River basin and to a minor degree in other parts of Wyoming above the principal Frontier sand but in the same formation are known as the **Wall Creek** sands. The **Eagle** sandstone is the principal gas-producing reservoir in Central and eastern Montana.

In California, the thick **Chico** formation of Upper Cretaceous age was the oldest formation deposited after the building of the Coast Ranges which is believed to have good possibilities for oil. To date, however, it has yielded only gas, being the principal reservoir in the fields around San Francisco Bay and in the northern part of the San Joaquin Valley.

Around the Gulf Coast, there were three major embayments during Upper Cretaceous times. In the westernmost of these embayments, the Rio Grande basin, the only producing formations are the **Austin** chalk which was partially eroded prior to the deposition of the Taylor marl, a weathered volcanic rock, locally referred to as **serpentine** which was laid down on the Austin and also partially eroded before the deposition of the Taylor, and stray sands in the **Navarro** formation which may be correlated with the Nacatoch farther to the east. These produce in the San Antonio district but have not yet been proved productive in the true coastal areas.

The middle embayment, at present the most important, is the East Texas basin which extends around the north flank of the Sabine uplift, merging with the Mississippi embayment. Deposition in this basin began with the laying of the **Woodbine** sand which was partially eroded prior to the deposition of the overlying Eagle Ford. Principal production from this formation is along the eastern side of the basin in the East Texas field, on structure within the basin as at Van, Hawkins and other fields and along fault lines in the Mexia fault zone, at Mexia, Powell and other fields. Above the Woodbine, sands in the Austin, Taylor and Navarro groups are productive locally, forming in some fields a series of multiple pays. These include the **Tokio, Ozan, Buckrange, Blossom** and **Nacatoch** of which the last named is the most widespread. The **Annona** chalk which has been correlated with the **Selma,** is a less important producer in the East Texas area but is the principal gas pay at Monroe.

In the Mississippi embayment, there has been considerable promise of production from the **Tuscaloosa** but no commercial production has developed. As this is being written, however, a good prospect has been found in Mississippi near the Alabama State line. The **Eutaw** is the principal producing zone at Tinsley where several sands produce.

EXTENSION INTO OTHER AREAS: With the exception of the Mississippi embayment, the areas where shallow Upper Cretaceous production may be expected have been thoroughly prospected. All of the basins now producing from formations of this age, however, have the possibility of containing important Upper Cretaceous deposits.

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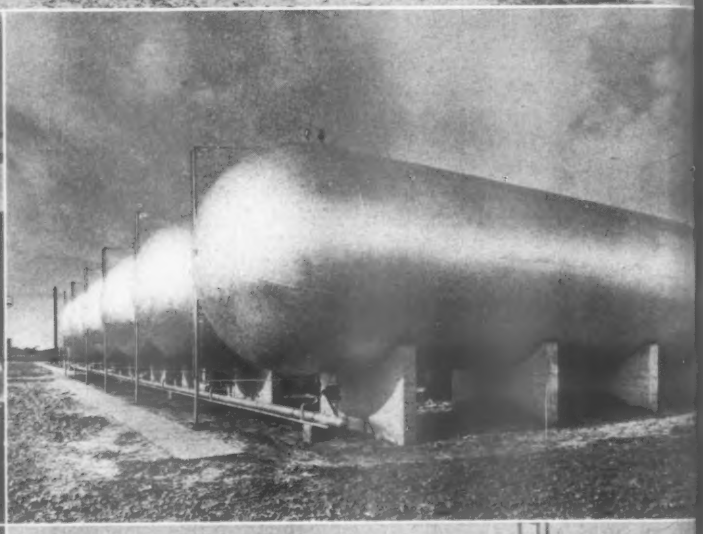

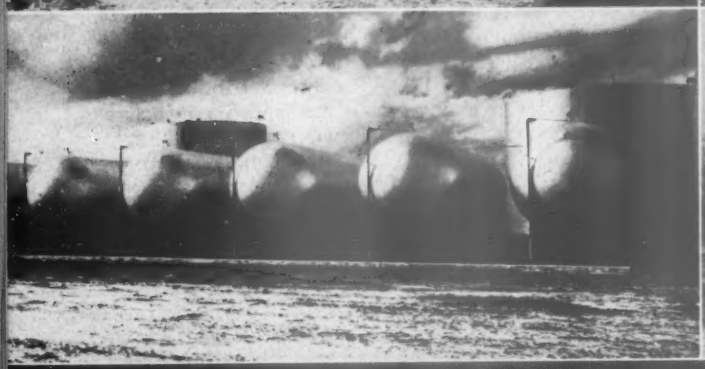

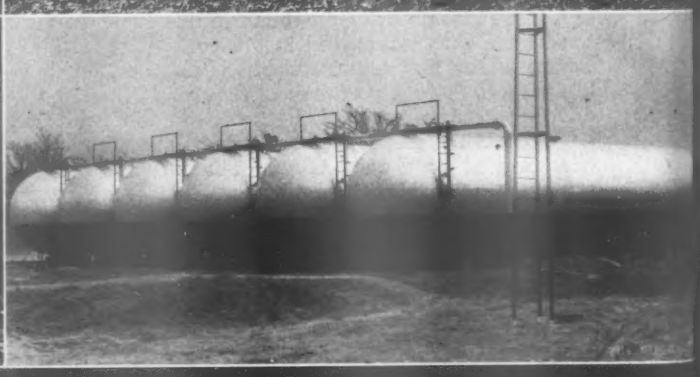

Front Lines in

REFINING

by Arch L. Foster

What It a "Sour" Crude?

FOR a generation oil men, especially refiners, have talked of the characteristics and foibles, the handling and mishandling of "sour" crudes. From paternalistic Washington's deliberative chambers comes the dictum that refiners should prepare themselves to handle sour crude even though they have had formerly an excellent source of sweet crude to run in their plants; the sweet crude production may not be enough to go round; war products must have precedence over other products.

The definition of sweet and sour are practical definitions, often made to fit a specific situation or purpose. One definition which has been quoted is that a sour crude is one which, either originally or during the conditions of processing develops corrosive products, especially hydrogen sulfide. This definition doubtless serves a practical purpose well, since corrosiveness is one of the main differences between the properties of sour and sweet crudes which affects the refiner's operations most seriously.

However, other considerations are involved, not included in this definition. For many years we have referred to gasolines as "sour" if they produce a black precipitate when treated with doctor solution—litharge dissolved in caustic soda to form sodium plumbite. A very voluminous literature has been assembled around these reactions and the methods for obtaining the desired results by their use. Conversely, a gasoline is sweet if it causes no such precipitate with doctor solution although the sulfur content may have been reduced not at all, or may have been increased by the doctor-sweetening process. More than one refining company has marketed gasolines which are not sweet but which do not corrode copper in the standard test, and so far as is known do not corrode automotive or storage equipment in service or storage. Therefore corrosiveness or the absence of it cannot be a definite criterion, if we accept that definitive principle as sound.

Crudes containing salts suspended or dissolved may be and generally are corrosive, especially at higher temperature as found in primary or cracking distillation procedures, yet these crudes are not "sour" in any accepted sense, unless they contain also sulfur compounds.

Nor can the sour sobriquet be applied only to crudes heavy with H_2S. Merceptans, sulfur compounds in which one of the hydrogen atoms of the H_2S molecule has been replaced by an organic radical, are the chief offenders and are the victims of doctor and other sweetening processes, in which the mercaptans are converted to sulfides, disulfides, polysulfides, or what-have-you, products of less or practically nonexistent corrosiveness.

It is more than probable that the industry may soon need a more exact definition of what constitutes a sour crude. Large and important contracts between crude producer and refiner may hinge on the determination of sourness or sweetness of a crude. We would like to know the reactions of oil technologists, and their suggestions as to definitions for "sour crudes" and what they are.

Kansas Crude Goes Here—and There

THE problem of supplying Kansas' local refineries, most of them medium-to-small independent refineries, with crude for charge stock is becoming a more pressing one.

During July Kansas produced an average of 290,628 bbl. of crude daily; the refining capacity of Kansas refineries as of the latest figures is 182,350 bbl. per day, crude charge. These refineries averaged charging 156,000 bbl. per day during the month of July. In May the average charge rate was 153,000 bbl. per day. In July the difference between state production and state consumption of crude, practically 135,000 bbl. per day went to refineries outside the state, chiefly in the Chicago area. In the meantime, the state has 14,500,000 bbl. of crude storage capacity. During this period only 3,200,000 bbl. of crude were in storage in the state, leaving 11,300,000 bbl. of empty capacity, or 78 per cent of the total capacity unused. The refineries have been running at about 85 per cent capacity.

The situation is not too pinching, at present. The prospective situation becomes acute if we assume, as is most likely to be the case, that various producer - refiners may soon need more of their production for their own plants, and so withdraw deliveries from nonproducing refiners now supplied with crude for operations. Several producers in the state have in the past consigned large percentages of their Kansas production to local refiners, who have little or no production of their own. These producers have plants, busy in building and operating units for making war-critical products; when these plants now building are on stream these refiners will probably require more crude; they can get it generally only by taking their own production now going to other refiners, on contract. What are those refiners to do, when their crude supplies are taken? The drop in production, the unlikelihood of increasing crude output materially leaves the question a serious one to those refiners whose existence as operators is dependent on supplies from producers who may be forced to requisition their contracted crude for their own war-critical operations.

Of the crude leaving the state, every barrel of it, apparently, goes to refining areas just as important in war-critical operations as any part of the refining industry. Therefore a mere "Keep the crude in the state to run the state's refineries" is not equitable in wartime, informed men say. More important matters are involved. Of this transported crude, Stanolind, handles some 65,000 bbl. per day; Sinclair Prairie, 15,000 bbl.; Cities Service, 34,000 bbl.; Texas Co., 20,000 bbl.; Phillips, 10,000 bbl., and several thousand each to Shell, Skelly, etc., making a total of more than 160,000 bbl. all told. These figures are approximate and include certain amounts of crude brought into the state.

The answer to the question of where to, and how to, get crude is the answer to the question of the operating life of some of these local refineries.

On the other side of the picture is the position of several companies having large plants in the Middle West connected to trunk lines with large gathering systems which have been operating for years in Kansas. They also are making war products and they need more crude.

Kansas observers say this is the inevitable situation that develops when the Government restricts producing operations so that new oil is not found in sufficient quantities and when pipe-line companies can't expand their operations normally. More will be heard about the Kansas crude situation.

PROGRESS IN METALS

by W. L. Nelson

Castings for Low Temperatures

Abstract: Ziegler & Northrup, Trans. Am. Soc. Metals, Vol. 30, Dec. 1942, pp. 1087-1114. Taken from Metals & Alloys, April.

The problem of making low-alloyed steel castings to meet the tentative specification of 15 ft.-lb. Charpy impact resistance at —100° C. may be considered basically solved. In order to present industry with technical evidence, which could be directly applied to commercial production, work has been conducted on a semicommercial and commercial scale.

Semicommercial Work

Each experimental melt was made in a 200-lb. high frequency induction furnace and cast in three "keel" test molds made from green sand. Unless otherwise specified all were subjected to the following heat treatment:

1. Normalizing at 950° C. (1,740° F.).
2. Air quenching from 840° C. (1,545° F.).
3. Drawing at 650° C. (1,200° F.).

Liquid quenching was not used because it is effective with thin-walled articles only. It was found that a repetition of the heat treatment improved the low temperature of the impact resistance.

The chemical analysis of this steel, as determined by these experiments, should be as follows: C. 0.05 per cent maximum; Si, 0.20 to 0.50 per cent; Mn, 0.50 to 0.80 per cent; S, 0.03 per cent maximum; P, 0.02 per cent maximum; Ni, 3.5 to 4.0 per cent.

The degree of deoxidation and general purity of the metal are highly important. It was proved that a careful treatment of the molten metal bath with basic slag is essential. After the ingot iron and nickel were melted and superheated, lime was introduced to the surface of the molten metal and allowed to become thoroughly mixed with the melt.

At the end of 10 minutes the slag was removed and a mixture of burnt lime, spar and ferrosilicon added to the molten metal. This is to facilitate further scavenging of the bath. The electrical power input to the furnace was kept low to allow the slag to completely cover the metal.

After another 10 minutes the second slag was removed and ferrosilicon, ferromanganese, and alloying elements (if any) were added to the charge, and the entire melt brought to pouring temperature. Additional small amounts of ferrosilicon and ferromanganese, as well as some aluminum, were placed in the ladle before the furnace was tapped. The metal was poured at a relatively low temperature and during the pouring of each mold small pieces of aluminum were thrown in the ladle.

The minimum physical properties of the straight nickel steel are:

Tensile strength, 60,000 lb. per sq. in.
Yield point, 40 lb. per sq. in.
Elongation, 35 per cent.
Reduction of area, 60 per cent.
At room temperature:

Charpy impact resistance, 40 ft.-lb. at —115° C., 20 ft.-lb.

It was found that the 3.5-4.0 per cent Ni, 0.05 per cent maximum C steel usually fractured at 60,000 to 65,000 lb. per sq. in. Attempts to raise the tensile strength proved that the addition of approximately 0.15 per cent V, 0.35 per cent Mo, and 0.50 per cent Cr improved the room temperature tensile strength, although to a certain extent reducing its low temperature impact resistance. However, as this reduction is not necessarily below the minimum value of 20 ft.-lb. at —115° C. (—175° F.) it may be tolerated. When nickel and molybdenum are properly balanced, the maximum carbon content may be raised to 0.10 and probably even to 0.15 per cent.

Microexamination revealed that, generally speaking, the steels most resistant to low temperature embrittlement are those in which carbon is present as spheroidal carbides. The first appearance of pearlite is associated with a drop in low temperature resistance. When in spite of relatively high carbon, the spheroidal state can be preserved, reasonably high impact resistance may be expected.

Nickel and nickel-vanadium steels, irrespective of carbon content, did not have any suppressed transformation and thus did not indicate any potential danger of hardening or embrittlement resulting from rapid cooling, such as after welding. Nickel-molybdenum steel showed a slight suppressed transformation which would probably be intensified by more rapid cooling.

Industrial Experience

In order to prove that these experiments could be reproduced in the shop, four metals were made, using ingot iron as material in two cases, and high grade steel punchings in the other two. They were cast into 3-in. flanged valve bodies weighing about 85 lb. each. Standard tensile and impact test pieces were machined from them and subjected to testing.

These tests showed that the tensile strengths of the "punching" heats were higher than those of the "ingot iron" heats. Yield points, elongations, and reductions of area were nearly the same. The impact resistance of the "ingot iron" at all temperatures was far superior to that of the "punching" heats, although the reason for this is unknown.

A 4-in. flanged body, weighing about 265 lb. was cast from a 600-lb. production high frequency induction furnace using ingot iron as raw material. This was also tested. Results in both cases clearly indicate that industrial castings for applications at temperatures down to —115° C. (—175° F.) can be satisfactorily manufactured.

Cost of Magnesium And Aluminum

The enormous increase in the production of these metals during the war has resulted in much lower prices, prices which make these metals direct competitors of other metals such as copper, zinc and lead. The latest price reductions bring these prices to:

Aluminum—14-15 cents per pound.
Magnesium—20½ cents per pound.

In comparison, the cost of copper is 12 cents per pound. Considering the strength of these materials and their light weight, it appears that even the lumber and plastic industries will encounter vigorous competition.

Metallurgical Terms

Ferro Alloys

Iron alloyed with some element such as manganese, chromium, silicon, etc., used for adding these elements to a melt of steel, is referred to as a ferro alloy—as ferromanganese, ferrochromium or ferrosilicon.

Safety practices in boiler houses

Information furnished by "Oil and Gas Journal"

Safety in boiler operation, like safety anywhere, should never be taken for granted. For example, blown-out manhole covers are a remote possibility. Still some means should be provided to protect personnel from debris, steam and hot water, just in case.

Proper protection of gauge glasses from outside damage is an important precaution. This is easily accomplished by enclosing them in a heavy wire screen. The screen will also tend to stop flying glass in case of internal rupture.

Vibration in pipelines can cause comparatively rapid deterioration. Injectors and pumps should be so firmly bedded that neither vibration nor reciprocating motion is telegraphed to suction or discharge lines.

Blow down pits or trenches should be so arranged as to protect passing persons or vehicles from steam or hot water. A shallow pit with a vertical vent extension into which blow down lines discharge, and from which water is discharged by overflow, has proved effective in many cases.

All moving or rotating parts of pumps or other apparatus should be equipped with effective guards. Hot lines and valves should be either covered, or so located as to be inaccessible to accidental contact.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.

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Photographic Templates May Be Adopted In Oil-Industry Fabricating Shops

by Paul Reed

A FAST, economical and accurate method of making templates by photographic processes for the airplane industry may have a broad application in the postwar period which will be of value in the fabrication of certain types of equipment made in the shops of the oil industry and its suppliers.

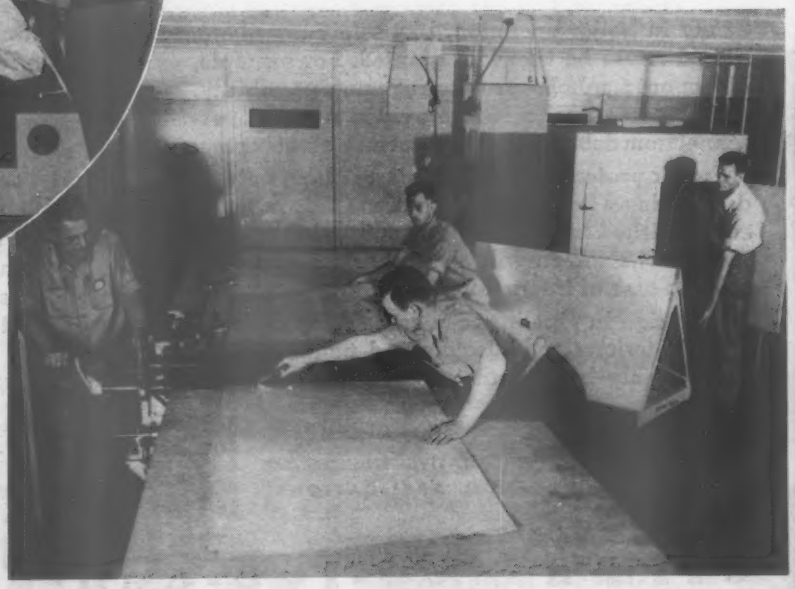
More than 2 years ago templates of all kinds were generally drafted by hand. Today phototemplates are very widely used in airplane manufacture. In fact, if it were not for the speed of phototemplating it would not have been possible for the United States to go into production of new types of airplanes as rapidly as it has since 1941.

This article is the outcome of suggestions made to the writer by Douglas Aircraft Co., Inc., Tulsa, engineers who believe that superintendents of fabricating shops serving the oil industry may find that phototemplating has advantages for them in certain cases. Material for this article was prepared from observation of the phototemplate process at the Douglas company's Tulsa bomber plant and by information furnished through the cooperation of the Eastman Kodak Co., which has been active in developing the new technique. Additional data have been furnished through the courtesy of Boeing Airplane Co., Wichita, Kans., division. During preparation of this article, interest has been manifested in the subject by oil-country shop superintendents. Some geophysical exploration organizations are known to have been studying the possibilities of phototemplating for their own shops.

Believing that the photo template process, which saves Douglas Aircraft Co.'s Tulsa plant thousands of dollars a month, will have a broad application in the future which may be of value to the oil industry and its suppliers, the Douglas company has given access to its laboratories for the preparation of this article. Photographs have been taken by the Douglas organization especially for illustrating this discussion.

Left: Pouring adhesive onto plate glass sheet to which the negative will be glued

Below: Sheet metal is fed through an Eastman laminating machine where the lino-graph transfer paper sensitizes the template metal. In the background, an employe places a glass plate, to be used later as a negative, in an oven



Some of them believe that phototemplating will be excellent for making complicated drill jigs because it insures more accurate measurements than are possible with conventional hand methods. Wherever templates are used for making a number of identical items, phototemplating will be useful. However, no industry is likely to utilize phototemplating on the present large scale of airplane manufacturers.

For, in the making of a new type or model of airplane, more than 20,000 metal templates from drawings are made in accordance with "lofting" practices long established in shipbuilding. These are needed for con-

Every Rugged Mile Reflects *Experience*

It's KNOWING HOW that counts in pipelining — knowledge that isn't inbred in man. Only thru EXPERIENCE does a pipeliner become top-notch, which gives us something to crow about. We've been pipelining 25 years, and while we are still learning, we also KNOW HOW to do a real job of pipelining!

OKLAHOMA CONTRACTING COMPANY

DALLAS, TEXAS

Left: Making an exposure for printing, directly on the metal plate, in the vacuum printing frame. Vacuum holds the plate against the negative. Right: Removal of a metal print after development by conventional photographic process

trol of routing, drilling, construction of press dies, inspecting and other operations. Templates that formerly took several weeks to lay out can now be photographically reproduced in a matter of minutes. Time between completion of the engineering drawings for a new airplane and the first test flight has been reduced 2 to 4 months. Savings of at least 50 per cent can be effected consistently One of the leading airplane concerns reports that on the first model produced by photocopying methods a saving of $25,000 to $30,000 was achieved.

Exact duplicates, reductions or enlargements of engineering drawings are easily made.

Produced Directly on Metal

Parts for experimental or production airplane operations can be produced directly on the metal used in fabrication of the part. All drill holes forming lines, etc., are accurately indicated. However, most phototemplating is done by reproduction on 1/8-in. sheet steel both for "layout templates," used like dressmaker's patterns which might be designated as true templates; and for "loft line drawings," with contour lines on them which are used about the shop like blue prints. Layout templates are from a few inches to 16 ft. in length.

Phototemplates are rugged; the drawings are firmly photographed on the steel and are not readily scratched off. They do not appear to require especially careful handling once they are completed. They maintain uniform size and shape under shop conditions and may be conveniently filed. Dimensional changes are avoided.

Drill jigs can be made directly in the camera from the engineering drawing and the location of each drill hole shown. After this part has been made photographically it can be mounted on plywood or masonite, the holes drilled and bushings inserted. Thus an accurate jig for drilling the part can be made with the least possible effort.

Advantages of Process

In a nutshell, the advantages of phototemplating are the elimination of manual drafting and the consequent economies. Furthermore, it is a flexible technique. Some additional advantages found in practical experience are the following:

(a) Rapid phototemplating aids in subassemblies and subcontracting.

(b) Modifications of models can be made readily on copies photographed from old detail drawings.

(c) Small-scale models for any purpose can be rapidly obtained by reductions from full-scale drawings.

(d) Shrink templates for casting patterns and plaster "mockups" can be rapidly made by enlargement in the camera.

(e) Small-scale engineering layouts can be photographed and enlarged full scale.

(f) All copying errors are eliminated and there is no need for rechecking. Dimensions may be omitted from template drawings. However, photocopying does not correct errors.

A West Coast shipyard uses phototemplates to avoid waste in cutting steel plate.

Photocopying methods, long used for tracings, blueprints, photostats, etc., have been adapted to fabricating shop needs through new methods of applying projection-speed, photosensitive layers to sheet materials such as metal, plywood and composition boards.

Phototemplate making has numerous variations. Only the principal features will be covered here.

The final template is made either by projection with a camera that costs $16,000 or by the contact method with simpler equipment. Negatives used in either case are made by the luminescence method, utilizing irradiation by ultraviolet or X-rays, or the reflex method, with which the exposure is made by placing the original drawing in contact with photographic material and by directing visible light through the back of the photographic material, barely affecting it, but being reflected sufficiently by the white areas of the drawing to give additional exposure to permit development of a satisfactory image.

Two Special Procedures

Two special procedures are used for sensitizing steel and other template material. Because of the accuracy possible with it, matte transfer paper of Eastman Kodak Co. is used for most materials processed. The emulsion from this paper is applied to the template material with a laminating press or wringer. For materials which cannot be laminated, a liquid template emulsion is used.

Exposure and developing of templates is done by conventional photographic methods.

The Douglas Tulsa plant has a phototemplate department specially designed and equipped for this important work, photographs of which were taken by the Douglas company to illustrate this article. The contact method is used entirely. Negatives

(Continued on page 44)

Oil-Well Pumping Practices—No. 10

Plunger Travel From Cards

by J. Zaba

In place of the formulas discussed in last week's installment, the effective travel of a pump plunger may be shown by analysis of dynamometer and dynagraph cards. The methods employed are described in the current installment of this series which began in the issue of July 1.

AT slow speeds the stretch of rods and the actual, effective travel of the plunger may be, in some cases, apparent directly from a dynamometer card. In case of the card shown in Fig. 1 the plunger stroke[1]

$$S_P = S_R \frac{A}{B}$$

where

S_P = plunger stroke
S_R = polished-rod stroke

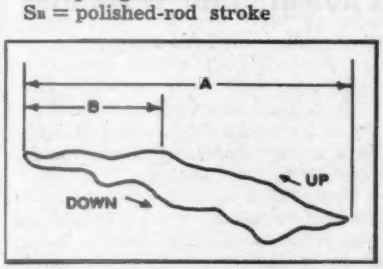


Fig. 1—Indication of plunger stroke in a dynamometer card

At speeds generally used in pumping operations, however, the dynamic forces distort the dynamometer card to such a degree that stretch of rods is not easily recognizable in the diagram.

Graphic method.—J. C. Slonneger presented[2] a method of a graphic analysis of dynamometer cards. The part of analysis dealing with graphic determination of plunger travel from a dynamometer card can be summarized as follows: Given the motion of one end of a sucker-rod system, that is the motion of the polished rod, and the instantaneous loadings, and what follows instantaneous stretch of the rods, at different points of the polished-rod motion, the motion of the other end of the rods, that is the plunger stroke, can be quite accurately determined. Graphic solution is particularly adapted for this method since with given curve of the polished-rod motion the stretch of rods has to be only added or subtracted in order to arrive at the curve of the relative plunger motion.

To accomplish this the dynamometer card is placed in such a way that the loads are read horizontally and the polished-rod positions vertically, with upstroke upwards (Fig. 2). To the right of the card a semicircle is drawn with diameter equal to the polished-rod stroke and to the same scale as the dynamometer card. For all practical purposes projection of any point of the card on the semicircle represents corresponding position of the crank. From the semicircle the polished-rod motion curve is plotted with crank positions as abscissa and polished-rod positions as ordinates. To be able to determine graphically the stretch of rods, for any desired point of the polished-rod motion curve, the rod stretch line is laid out. The static weight of sucker rods is taken as zero stretch (point B Fig. 2). The stretch of rods due to their own weight is laid out, below the base line, (negative stretch), on the zero line of the card (point C Fig. 2). This stretch may be obtained from the formula:

$$e_r = \frac{L^2}{1{,}320{,}000}$$

where

e_r = stretch of rods due to their own weight, inches
L = length of sucker rods, feet

Point A, for indicated dynamic loading, can be secured from the formula:

$$e_d = \frac{PL^2}{1{,}000{,}000\ W_r}$$

where

e_d = stretch due to dynamic loading, inches
P = dynamic load, pounds
L = length of rod, feet
W_r = weight of rods

For the assumed case shown in Fig. 2 for the 10,000-lb. dynamic load the stretch is 14 in. From the base at 16,700 lb. (10,000 lb. above weight of rods) point A is laid out 14 in. above the base line (positive stretch). The stretch for load due to rod weight is 7 in. (point C).

With polished-rod motion curve, load card and rod stretch line available the points of the relative plunger motion curve can be secured by determining for as many points of the dynamometer card as convenient the instantaneous rod stretch and subtracting (or adding) this stretch from the polished-rod motion curve. To illustrate, select a point D on the dynamometer card. Downward projection to the rod stretch line indicates instantaneous rod stretch, corresponding to loading of point D, as 19 in. Projecting point D horizontally to the polished-rod motion curve point D, is obtained. Laying off 19 in. downward from point D_1 point D_2 is

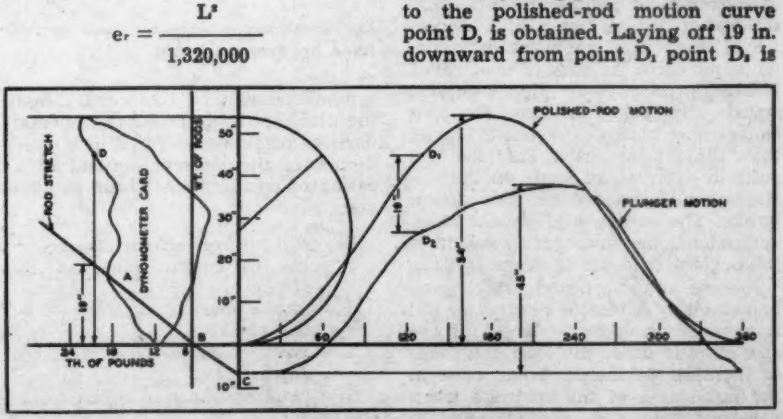


Fig. 2—Graphic method of determining plunger travel from dynamometer card

secured. This point represents the relative instantaneous position of the plunger. In the case shown in Fig. 2 the plunger travel is 45 in. with 54-in. polished-rod travel.

Approximate method. — Emory N. Kemler outlined[3,4] an approximate method of determining the actual length of plunger travel from dynamometer cards. This method requires the knowledge of points on dynamometer card at which the opening and closing of pump valves takes place. The closing of the traveling valve, on the beginning of the upstroke is quite often recognizable on the card. The method assumes that the closing of the standing valve takes place at about the same point, after the beginning of the downstroke, as the closing of the traveling valve after the beginning of the upstroke. If the load, as indicated by the dynamometer card, is higher at the beginning of the upstroke than at the beginning of the downstroke then the rods were stretched more, were longer, at the beginning than at the end of the upstroke. In other words, during the upstroke the rods contracted by the difference between the two stretches. This shortening of the rods was translated into the additional travel of the plunger in relation to the polished rod creating conditions of overtravel. By calculating stretches corresponding to the loads at the beginning of the upstroke and beginning of the downstroke and adding the difference to the polished-rod stroke approximate plunger travel can be determined. Conversely, if the load, as indicated by the card, is lower on the beginning of the upstroke than on the beginning of the downstroke, then the rods became longer during the upstroke. Part of polished-rod travel went into stretch of rods with the resulting loss of plunger stroke and conditions of undertravel are existing. By calculating the difference in stretches and by subtracting this difference from the polished-rod stroke approximate plunger travel can be arrived at.

Indication of plunger travel.—Conditions of severe over and undertravel are quite apparent in dynamometer cards. In case of overtravel, created primarily by high pumping speeds, the spring action of the rods causes the plunger to travel faster than the polished rod. This fact results in decrease of loads on the upstroke and increase on the downstroke. The card would have a characteristic slope, downward away from the beginning of the upstroke (Fig. 3).

In case of undertravel, which may be caused by excessive plunger or rod friction or plunger too large for the size of rods used, the load continues to increase on the upstroke, even in the last stages of the upstroke when deceleration of rods should result in decrease of loads. The card for such

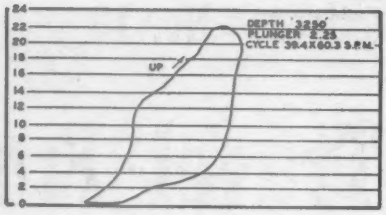


Fig. 3—Dynamometer card for overtravel of plunger. (Courtesy S. M. Jones Co.)

conditions has a characteristic slope upward from the beginning of the upstroke. Extreme case would be that a sanded pump where all of the motion of the polished rod goes into stretch of rods, with no motion of the plunger (Fig. 4).

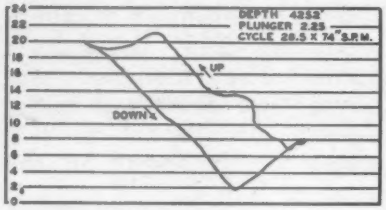


Fig. 4—Dynamometer card for extreme case of undertravel of plunger. (Courtesy S. M. Jones Co.)

Plunger Travel From Dynagraph Cards

In Installment 4 of this series, general discussion was presented of the pumping cycle as recorded by pump dynagraph card. For the purpose of identifying the plunger travel, and its different component parts, a basic dynagraph card is shown in Fig. 5. The

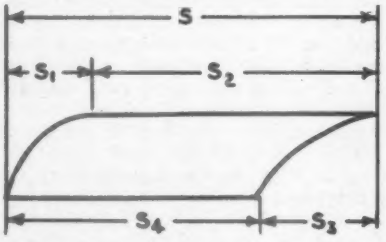


Fig. 5—Phases of plunger travel as indicated by dynagraph card

symbols, shown on this card, denote the plunger stroke and its component parts as originally defined in a paper discussing the construction and application of dynagraph.[6] These symbols are:

S = full plunger stroke
S_1 = gas expansion phase of upstroke
S_2 = intake phase of upstroke, effective stroke
S_3 = gas compression phase of downstroke
S_4 = exhaust phase of downstroke

Plunger stroke for different size plungers, with one run of dynagraph, can be determined by running a number of dynagraph cards during the time the well is pumping up to the surface. This establishes relationship for the given well between loadings and plunger travel. By calculating loads in the well for other size plunger the stroke of the plunger can be determined.

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Photographic Templates

(Continued from page 42)

are made by the reflex method for this plant.

Template material is held snugly to the copy board by vacuum effected by a small compressor. Developing is done in vertical tanks.

The largest piece of equipment and the one requiring considerable attention is the laminating press or wringer by which stripping, gelatin-silver, emulsion is transferred from a paper base to the lacquered material to be sensitized. This laminating equipment is simple and can be readily built by a good machine shop.

All phototemplating at the Boeing Wichita plant is done by camera because of the advantages of making from a single negative either full-scale templates, shrink-scale templates or one-half size photo drawings. Much care must be taken to assure accurate adjustments with the camera method. The company now regards phototemplating as an essential production process because tooling time for new models and revisions of present models has been materially reduced.

From a first impression, it would appear that few organizations outside the airplane and shipbuilding fields could justify the expense of phototemplating. But it has been suggested that numerous industries within an area could be served by a central commercial plant doing this work. Within recent months several commercial photoengravers have contracted similar work done for munitions and marine programs. So far the war demand for photographic materials has been so great that no attempt has been made to push the extension of phototemplating to other fabricating shops of the country's industries.

WATER AND PRODUCTION COSTS

THE economic limit in the case of wells producing large amounts of water depends to a large extent upon the smallest percentage of oil which can be produced profitably. In general, lifting costs increase greatly as it becomes necessary to handle larger and larger volumes of water in order to obtain the oil.

Consequently, if future production costs are considered, it is frequently necessary to estimate the amount of water which necessarily is produced before oil depletion. Estimates of future water production are also used in anticipating the future costs of salt-water disposal as well as the size and design of equipment which will be necessary to handle the salt water.

Water Production Trends

If the cumulative oil withdrawal for an individual well is plotted against the per cent oil in total fluid, it will be found that the trend is often a straight line on either cartesian coordinate or semilogarithmic graph paper. Since the water production depends mainly on individual well characteristics and changing conditions of operation, these trends (per cent oil vs. cumulative oil) may change over the life of the well. A trend characteristic of many wells producing large quantities of water consists of a reverse "s" curve when plotted on cartesian coordinate paper. As lower water percentages are reached, this curve tends to flatten out into a straight line.

If such is the case, future water production can be calculated with reasonable accuracy for this portion of the curve. Since this is also the period when large quantities of water are produced, when the lifting costs are increasing, and when the economic limit is being approached, the estimated future water production becomes important from an economic viewpoint.

Calculation of Future Water Production

A decline curve (plot of per cent oil vs. cumulative oil) is shown in Fig. 1. Curve "B" showing barrels of total fluid produced per barrel of oil has also been plotted. The cumulative total fluid production is the area under this curve and above the "x" axis. The mathematical equation for the decline curve (curve "A") is:

$$y = mx + b$$

where

y = fraction of oil in total fluid (per cent oil ÷ 100)

x = cumulative oil from time of first water production

$m = \dfrac{y_2 - y_1}{x_2 - x_1}$ where x_1y_1 and x_2y_2 are any two points on the straight line

b = value of "y" when x = 0 (in this case b = 1.00)

The reciprocal of "m" is the barrels of oil produced per 1 per cent increase in water production.

The total water production for any period ($x_2 - x_1$) is calculated by the following formula:

$$W = \frac{2.303}{m}\left[\log_{10}(1 + mx_2) - \log_{10}(1 + mx_1)\right] - (x_2 - x_1)$$

Sometimes it is more convenient to calculate the amount of water which will be produced during the period in which the oil percentage decreases from one value to another. In this case:

$$W = \left[2.303 \frac{(\log_{10}y_2 - \log_{10}y_1)}{(y_2 - y_1)} - 1\right](x_2 - x_1)$$

Example of Calculations

Referring to Fig. 1, the equation of the decline curve is:

$$y = 1 - 0.0000165 \times \text{ where}$$

$$m = -0.0000165$$

Calculating the water production to an assumed economic limit of 1 per cent oil in total fluid, corresponding to a cumulative oil figure of 60,000 bbl.:

$$W = \frac{2.303}{-0.0000165}\left[\log(1 - 0.99) - \log 1.0\right] - (60{,}000 - 0)$$

$$= 219{,}000 \text{ bbl. of water}$$

Calculating the water production by the second formula between 100 per cent and 1 per cent oil:

$$W = \left[2.303 \frac{(\log 1.0 - \log 0.01)}{(1.0 - 0.01)} - 1\right] - (60{,}000 - 0) = 219{,}000 \text{ bbl. water}$$

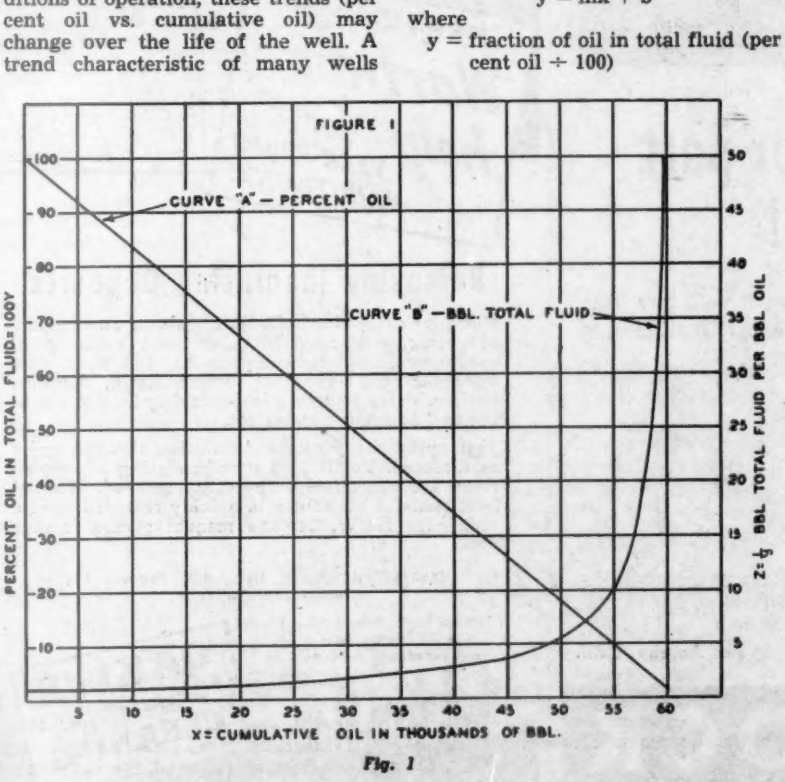

Fig. 1

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Engineering Fundamentals

No. 103

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

OIL-WATER SATURATION OF CORES

THE oil and water content of core samples from a new well is often measured in an effort to determine if the formation is capable of producing oil or if it is merely wet with oil and not saturated to a sufficient degree to produce oil in commercial amounts. Oil and water saturations are also applied quantitatively in the estimation of recoverable reserves of wells to be produced by either primary or secondary-recovery methods.

The retort method is the most popular of various possible methods for determining the oil and water saturation of core samples.

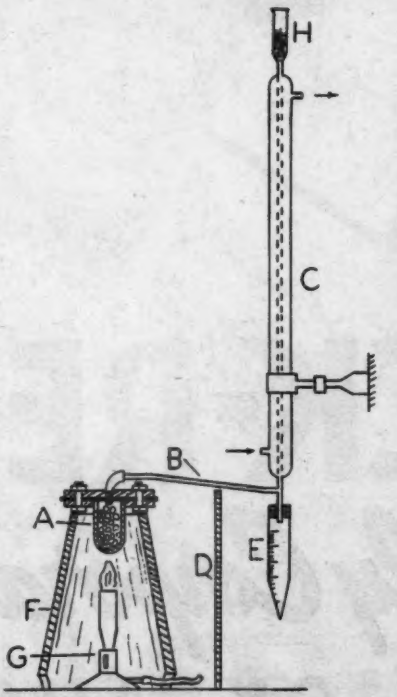
A retort with the required auxiliary connections and apparatus is illustrated in Fig. 1. The retort A is made from a 1½-in. bull plug by cutting it off to a length of about 2½ in. A bolted flange with an asbestos-graphite gasket may be used at the top as shown and fitted with the connection for the copper tube outlet B which leads to the bottom of the reflux condenser C. It was found that some of the cast iron retorts that are available on the market do not have a satisfactory method of preventing leakage of vapors from the retort. By placing a small amount of shellac on the surface of the gasket of the retort shown in Fig. 1, a satisfactory seal is obtained to prevent leakage from the retort. It is important that an excess of shellac not be used near the inside of the retort, or else some may be distilled over with the oil and water.

It is important that the copper tube leading from the retort slope downward toward the condenser tube connection. An asbestos shield D should be provided to protect the condensate graduate E from the heat around the retort. Water is circulated through the condenser C.

In the laboratory a sample of the proper size to fit into the retort is taken from the can or other sealed container, weighed, crushed to pea size in a mortar, and placed in the retort. The flange is then tightened on the top of the retort and connected to the bottom of the condenser as shown in Fig. 1. The chimney F is provided below the retort around the burner G so that a hotter flame may be applied to the retort. The sample is heated slowly at first; that is, the burner G is regulated about as low as it will burn and placed from 3 to 4 in. below the retort.

Another sample from the same piece of core, is used for determining the bulk density of the saturated core using a pycnometer and mercury as described in connection with the Melcher-Nutting method of absolute porosity determination, Installment 101 of this series. Then, the volume of the sample in the retort may be calculated by dividing the weight of the retort sample in grams by the bulk density in grams per cc.

A wad of glass wool and some calcium chloride should be provided at the top of the condenser in a tube H as shown in Fig. 1 to aid in the prevention of vapor loss from the top of the condenser during the heating process and to prevent entry of moisture from the air while the apparatus is cooling after the heating process. Care should be taken that the water is circulating through the condenser C before the burner is placed under the retort. After about 10 minutes of low heating, the burner should be turned up gradually and heated at a medium temperature for about 30 minutes. Finally during the last half of the heating process, the retort should be at a red heat. In this way the oil and water vapors are driven from the core samples through the copper tube B, into the condenser C where they are condensed by the circulating water and run down to the condensate graduate E.



After the apparatus has cooled, any condensate held in the condenser is swabbed down into the graduate and if the water and oil in the graduate E are not completely separated, they may be centrifuged before reading the volume of each. The sand is then removed from the retort, transferred to a small dish, and weighed. The loss of weight of the sand can be compared to the liquid recovery and thus a check on the results is obtained.

It is generally necessary to have calibration data on the retort based upon mixing measured volumes of water and oil with a given amount of sand, retorting it, and measuring the recovery. A large number of such tests on artificially saturated sands with various types of oils will yield data for a set of calibration curves which can be referred to in correcting test data. Tests of this nature have shown that if proper care is used complete recovery of the water can be obtained, and that the recovery of the oil depends upon its gravity. The lower gravity oils usually give a lower recovery, which can be explained by the fact that the heavier hydrocarbons produce a greater coking effect in the retort.

A sample taken immediately adjacent to the saturation sample may be used for determining porosity by methods described in Installments 101 and 102 of this series. This is done after leaching out the liquid content and drying the core. Then the assumption may be made that the retort sample had the same percentage porosity as the sample immediately adjacent to it. Thus, the pore space of the retorted sample may be calculated by multiplying the fractional porosity by the bulk volume of the retorted sample.

The water saturation expressed as a percentage may be calculated by the following formula:

$$S_w = \frac{V_w \cdot 100}{V_p}$$

where

S_w = per cent of pore space filled with water

V_w = volume of water recovered in the condensate graduate of the retort apparatus, cc.

V_p = volume of pore space or core sample, cc.

Series prepared by Glenn M. Stearns, associate professor of petroleum engineering, University of Oklahoma

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CONTRACTOR

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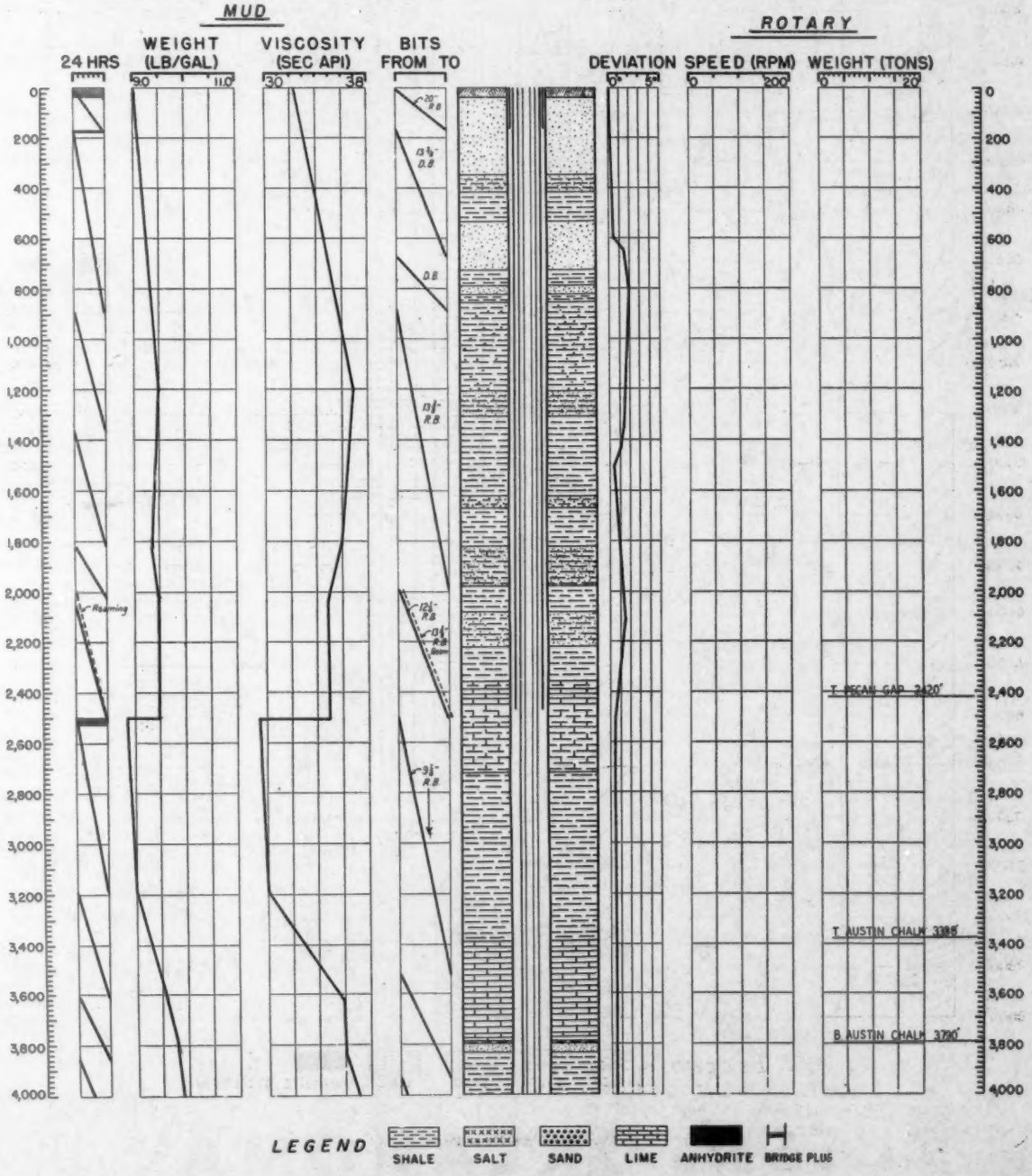

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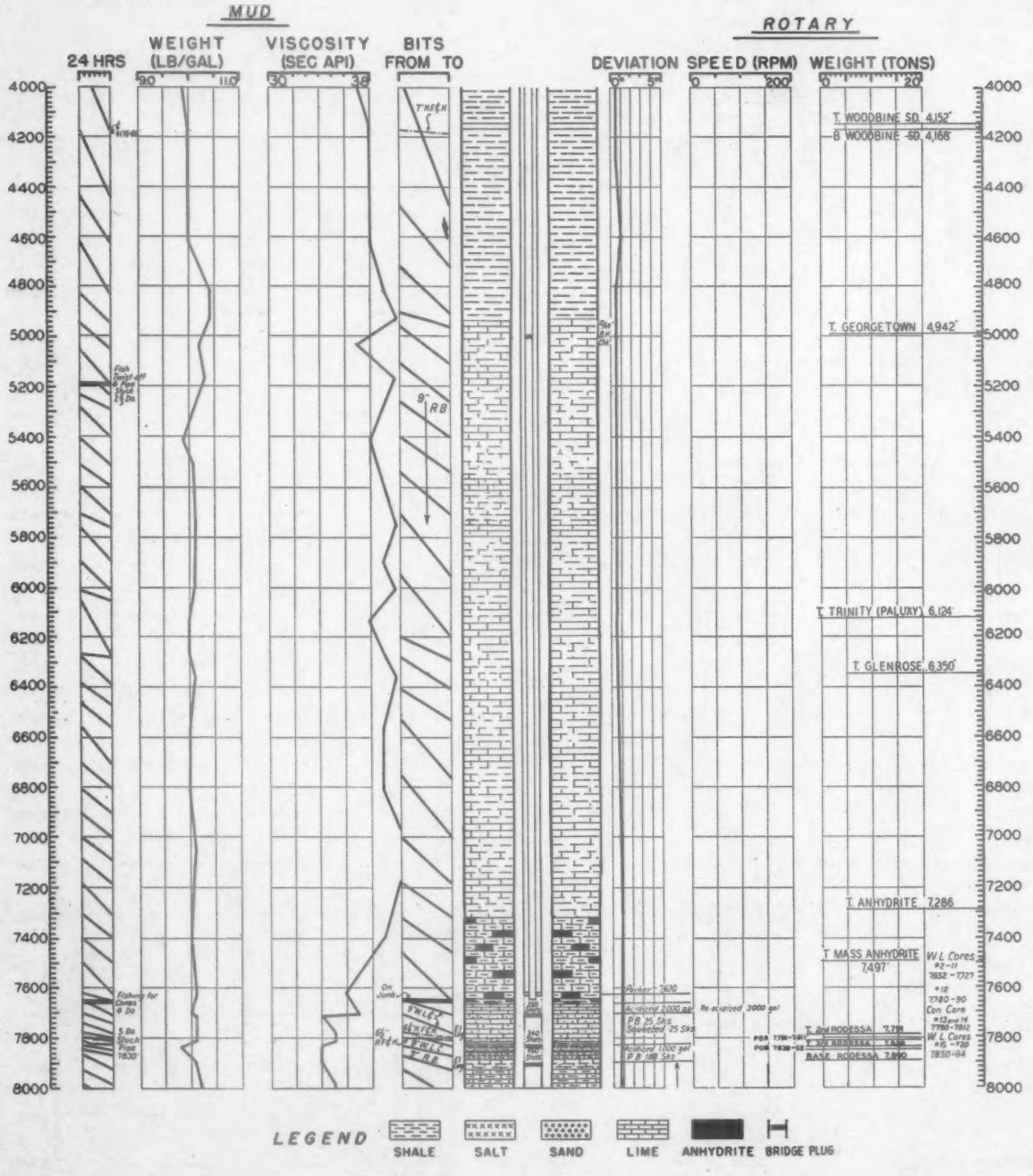
Extension Tri-Cities Distillate Pool, Henderson County, Texas (Continued)



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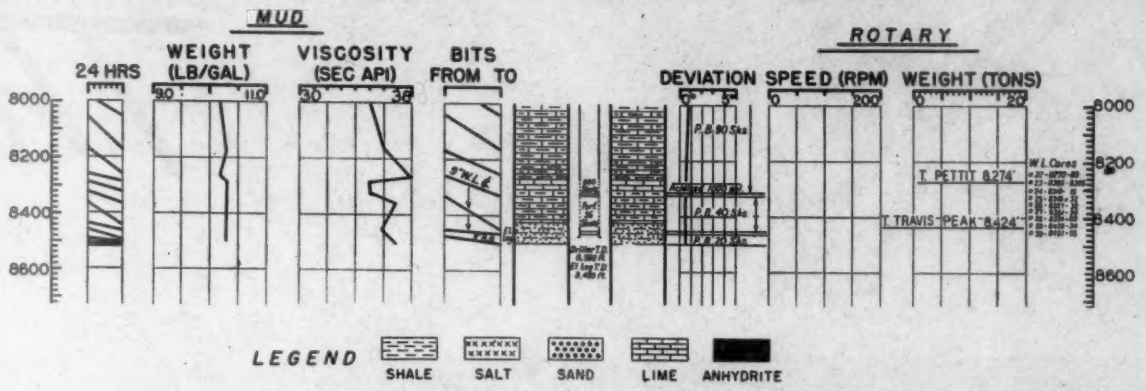
Extension Tri-Cities Distillate Pool, Henderson County, Texas (Continued)



LEGEND — SHALE, SALT, SAND, LIME, ANHYDRITE

DRILLING DATA

Started rigging up	1- 6-43
Started drilling	1-11-43
Set oil string	4- 2-43
Completed	6-12-43

	Days
Over-all well time	157
Rigging-up time	5
Time spud to setting oil string	80
Time oil string to completion	72
Drilling time record:	
W.O.C.:	
Surface pipe	1.00
Intermediate string	4.00
Fishing jobs (3)	13.25
Coring	4.00
Circulating	1.75
Straight-hole tests	.50
Safety (checking B.O.P., etc.)	.75
Repairs	8.00
Trips	10.50
Breaking down, running casing and cementing	1.25
Electric logging	.50
Drilling	45.50
Total	80.00

Completion time record:	Days
W.O.C. (oil string)	5.0
W.O.C. (squeeze and P.B.)	10.0
Drilling plug	2.5
D.S.T. lower zones	28.0
Perforating	6.5
Acidizing	5.0
Fishing	2.0
Displacing mud and swabbing in	3.0
Testing production	7.0
Installing B.H. choke	1.0
Tearing down	2.0
Total	72.0

Ran electric log:
2,473-7,797 ft.
7,797-7,926 ft.
7,926-8,499 ft.

Ran bridge plugs:
8,452-58 ft.
7,900-04 ft.
7,828-33 ft.
7,709-14 ft.

Core record: No.	Type	From To (feet)
1	Conventional	4,176-4,186
2-11	Wire line	7,652-7,727
12-14	Conventional	7,780-7,812
15-20	Wire line	7,830-7,864
22	Wire line	8,270-8,280
23	Wire line	8,296-8,305
24-25	Wire line	8,310-8,320
26	Wire line	8,327-8,332
27	Wire line	8,351-8,356
28	Wire line	8,374-8,379
29	Wire line	8,429-8,434
30	Wire line	8,451-8,455

Fishing:
5,187 ft.—Twistoff and pipe stuck.
7,650 ft.—Dropped pipe and knocked cones off
7,830 ft.—Stuck pipe

Perforated: Depth (ft.)	Shots
8,410-8,450	36
8,276-8,306	600
7,838-7,884	460
7,782-7,816	340
7,665-7,700	350

Acidized: Depth (ft.)	Gals.
8,276-8,306	1,000
7,838-7,884	1,000
7,665-7,700	2,000-3,000

Plug backs: From To (feet)	Cement (sacks)
8,500-8,458	20
8,314-7,904	90
7,900-7,835	188
7,828-7,782	50

BITS USED

No.	Size (in.)	Type
1	20	R.B.
2	13⅜	D.B.
2	13⅜	R.B.
1	12¼	R.B.
8	9⅞	R.B.
22	9	R.B.
6	9	W.L.C.H.
1	7	H.F.C.H.
1	6¾	H.F.C.H.
1	6½	H.F.C.H.
1	6	R.B.

TUBULAR MATERIAL

Size (in.)	Weight (lb.)	Type	Setting depth (ft.)	Cement (sacks)
16	65	Welded	162	160
10¾	40.5	H-40	2,449	1,380
7	28	N-80	....	....
..	24	N-80	....	....
..	26	J-55	....	....
..	24	J-55	8,475	476
2	4.70	J-55	7,646	....

MUD MATERIALS

Type—	Quantity
Aquagel	201 sks.
Baroid	159 sks.
Quadrafos	216 lb.
Soda ash	500 lb.
Quebracho	110 lb.
Marco clay	488 sks.

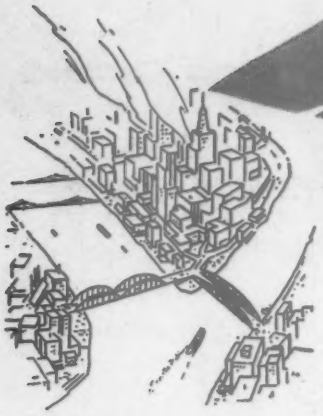
Oil used (to free drill pipe):	
Crude oil	211 bbl.
Diesel fuel	35 bbl.

COMPLETION

Swabbing unit used for testing	23 days
Producing zone—L. Glen Rose Rodessa lime:	
Perforations	7,665-7,700 ft.
Date of test	6-12-43
Packer	7,630 ft.
Surface choke	24/64-in.
Bottom-hole choke (5,000 ft.)	12/64-in.
Tbg. press. flowing	800 lb.
Tbg. press. S.I.	2,600 lb.
Csg. press. flowing	1,950 lb.
Flowed	12 hr.
Distillate prod.	148.30 bbl.
Gravity	65.6° A.P.I. at 60° F.
Color	Water white
Gas production	1,922,000 cu. ft.
Gas-distillate ratio	12,960 cu. ft. per bbl.

Gravity of gas:

Separator	Pressure (lb.)	Gravity
High pressure	290	.688
Low pressure	70	.877



The

e River of Oil

500,000 barrels of crude petroleum—30 miles from a railroad!

That was back in 1860—a year after Colonel Drake's first well began to produce riches, on Oil Creek, near Titusville, Pennsylvania.

The transportation problem was tough. But boats, barges, rafts—thousands of them—were pressed into service to form a veritable river of oil—down Oil Creek to the Allegheny to Pittsburgh.

Into this picture of river traffic, with its wild uncertainties and fluctuating costs, came the pipe line. It was one of the first oil field services filled by Spang Pipe, made since 1840 in the first pipe mill west of the Alleghenies.

Today, billions and billions of feet of Spang Pipe—now a National Supply Company product—are giving dependable service in oil fields, pipe lines, ships, all kinds of industries, homes, and other installations throughout the world.

All products of The National Supply Company have marched hand in hand with the ever-pioneering, ever-growing oil industry. National Oil Field Machinery and Equipment have been important factors in the development of every oil field in the world. National-built Superior Oil Field, Industrial and Marine Engines are internationally famous for their power and economy. The National Supply Company serves industry and the individual everywhere . . . and will be an important factor in the peacetime expansion of tomorrow.

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General Sales Offices: Toledo, Ohio. Division Offices: Ft. Worth, Texas; Tulsa, Oklahoma; Torrance, Calif. Export: The National Supply Corporation, 30 Rockefeller Plaza, New York, N. Y., U. S. A.; River Plate House, 12 South Place, London, E.C. 2.

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A Division of General American Transportation Corporation

Reactions in Cracking Process

(Continued from page 28)

carbon bonds can give three kinds of radicals.

$$C_4H_{10} \rightarrow CH_3 \cdot CH_2 \cdot CH_2 - + CH_3 - \quad (20)$$

$$C_4H_{10} \rightarrow CH_3 \cdot CH_2 - + CH_3 \cdot CH_2 - \quad (21)$$

Any one of these three or atomic hydrogen can react with another butane molecule to give a butyl radical, which can decompose to form butylene. More than a dozen other equations can be written to show possible reactions in this case.

According to this reaction mechanism it would be predicted that isobutane would form rather large quantities of hydrogen, isobutylene, methane, propylene, ethylene, and no normal butylene. Such appears to be the case, and isobutane is therefore not a particularly desirable stock for a thermal polymerization unit. A higher temperature is required, as in the case of propane, to produce a satisfactory crack per pass, and the losses due to demethanation are high.

Complexity Increases

As the molecule is lengthened, the complexity of the reaction increases in a geometric ratio. Since the temperatures usually employed are above the decomposition temperatures of most of the original hydrocarbons and primary decomposition products, we find all of them reacting, but at different rates. If we set the time and temperature for a cracking coil at the optimum for handling straight propane and then introduce some isobutane, we find the cracking conditions somewhat too severe and must reduce either time of reaction or temperature. On the other hand, if we introduce some ethane, we find the conditions too mild to secure satisfactory conversion. For n-butane we have to reduce time and temperature considerably below the figures which are optimum for isobutane and propane. And if n-pentane or n-hexane gets into a coil which is operating smoothly on a mixture of propane, isobutane and n-butane, coke formation will proceed rapidly.

The literature contains many references to the effect of temperature upon the cracking rate, some authors claiming the rate doubles for every 18° F. rise in cracking temperature, others maintaining that a rise of 30° to 35° F. is required for this increase in rate. The probabilities are that each group is correct for some particular kind of stock over a certain temperature range and that no one rate can describe the behavior of all stocks over wide ranges of temperature. It seems probable that hydrocarbons in any single class will crack with greater rapidity or at lower tem-

peratures as the size of the molecule is increased. This certainly seems to be true of the n-paraffins from ethane to n-decane. As the molecule is changed in structure for a given number of carbon atoms, we should expect the cracking rate to decrease in the following order: n-Paraffins, isomeric paraffins, olefins, cyclohexanes, cyclopentanes, aromatics, and polynuclear aromatics, or compounds containing both aromatic and cycloparaffin nuclei.

An excellent discussion of thermal cracking from the viewpoint of the present-day refiner is found in a paper by Keith, Ward and Rubin[13] presented before the midyear meeting of the American Petroleum Institute in 1933. Figure 2 taken from their paper gives the rate of change in cracking rate with changing temperature for modern equipment.

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BOOK REVIEW

OIL AND PETROLEUM YEAR BOOK—1943. Compiled by Walter E. Skinner. 20 Cophall Avenue, E.C. 2, London, England. 186 pp. 12s. 6d. net.

This volume, which incorporates the Oil and Petroleum Manual, is published annually. It is a record of companies interested in the oil industry, in the producing, refining, transportation, marketing and financial branches, operating in all parts of the world. It presents a list of managers, engineers, agents, etc. The book is fully indexed for easy reference.

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A dining-car passenger was served cold coffee. He complained. The waiter, as he returned to the kitchen for a cup of hot coffee, grumbled . . . "That man doesn't even know there's a war on!"
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REFINING

Union Oil Announces New Chemical Division

LOS ANGELES, Calif.—Formation of a chemical division, charged with the responsibility of developing current and postwar markets for new petroleum byproducts, has just been announced by Union Oil Co., with W. E. Major in charge. Mr. Major's experience covers 35 years in the chemical business, the last 16 of which were spent as an executive in a nationally known chemical concern.

Taking a postwar slant, the announcement emphasizes that many petroleum products which are now used exclusively to aid the war effort can be immediately transposed to the reestablishment of our peacetime economy. It is further pointed out that the rapid industrialization of the West has served as a great stimulant to the petroleum chemical industry, so that postwar production of petroleum chemicals here will make the Pacific Coast independent in this respect, saving western consumers the added costs of rail or water freight.

Chemical products now in the production stage include aromatic solvents, high-melting-point paraffin wax, toluene, and petroleum sulfonates. Through the medium of research in the chemical division, developments are progressing toward commercial production of petroleum acids, insecticides, fungicides, weed killers, fertilizers, flotation reagents and pharmaceuticals for postwar markets both here and abroad.

Standard of California Refinery Wins New Honor

SAN FRANCISCO, Calif. — The Richmond refinery of Standard Oil Co. of California has just received a new decoration from the Army and Navy. The refinery and its 3,000 employes have been awarded the star to be put on the Army-Navy "E" pennant awarded some months ago.

Word of the star award came in a letter from Adm. C. C. Bloch (retired), chairman of the Navy Board for Production Awards, to H. D. Collier, president of Standard of California. The decoration, said Admiral

Sketches of Plant Operators

JACK H. GRIMES, who was recently elected president of Socal Oil & Refining Co. succeeding C. A. Johnson, who was elevated to chairman of the board, was born in Blue Hill, Neb., and began work in the Huntington Beach field, California, as chemist and superintendent of the Holly Oil Co. in 1923. He was in charge of renovation of the Holly plant in 1925 when it was equipped to make gasoline, redesigned the unit again in 1929 and 3 years ago he rebuilt the plant at which time the capacity was increased and more modern equipment installed. The Socal Oil & Refining Co. plant at Main and Garfield streets at Huntington Beach, Calif., is now a modern refinery making a variety of refined products and special cuts. In addition to his election as president of Socal Oil & Refining Co., Mr. Grimes was made vice president of Holly Oil Co. in charge of California operations.

Mr. Grimes began his business career as an apprentice chemist with the Great Western Sugar Co. He soon joined Standard Oil Co. of California and he worked for some time in the chemistry division at the Greybull, Wyo., refinery.

Holly Oil Co. has production in the Huntington Beach field and this oil in addition to current purchases is refined and marketed by Socal Oil & Refining Co. throughout southern California.

JACK H. GRIMES

Bloch, will be affixed to a new pennant to be received soon by the refinery.

"The men and women of the Richmond refinery of the Standard Oil Co. of California have achieved a signal honor by continuing their splendid production in such volume as to justify this renewal of their reward," Admiral Bloch said.

The "E" flag was originally presented to the Richmond refinery employes last February, for "outstanding production of war material."

Toluene Plant Completed At Texas Co., Refinery

CHICAGO. — Large quantities of toluene, basic ingredient of TNT, are now being manufactured in a new $6,800,000 unit at one of the Texas Co.'s refineries in the Chicago area.

The new unit, first to be constructed in Illinois, was built under an Army contract. For military reasons its capacity cannot be disclosed.

The raw material used is a "cut" from straightrun motor gasoline. Extraction of the toluene is a difficult and costly process, but the finished product, a water-white, harmless-looking liquid, is shipped to other plants, where it is converted into trinitrotoluene by the so-called nitration process.

No formal opening ceremonies were held at the plant, as it was felt that the time could be spent more advantageously in actual production. Instead, employes at the plant received a congratulatory telegram from Texas Co.'s president, W. S. S. Rodgers, which read in part as follows:

"Modern warfare demands oil in many forms—superoctane gasoline and aircraft engine oils for bombers and fighter planes; fuel for battleships and cruisers; gasoline and lubricants for tanks, trucks, and jeeps; toluene for making TNT; butadiene, basic ingredient of synthetic rubber; petroleum coke for manufacturing aluminum, and hundreds of specialized products for war industries. Your company is a leading manufacturer of such products. Today, your 25,000 fellow workers throughout the United States extend hearty greetings to you. We are proud of the part you are playing in helping to win the war."

Synthetic-Rubber Plant To Start Operating Soon

SARNIA, Ont.—It is expected that the Polymer Corp. plant for the manufacture of synthetic rubber, the styrene unit of which started operations on July 1, will be in full operation within a few weeks. It is expected that in peacetime the plant will be able to take care of Canada's normal synthetic-rubber requirements.

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CARE IN USING TUBE ROLLING EQUIPMENT

Before rolling a tube into a header or tube sheet, the tube ends and header section should be thoroughly cleaned. No grease or oil should remain on the surface or in the serrations. These elements resist compression and will not permit the proper flow of metal. If this is neglected, heat will ultimately create hard carbon preventing re-rolling and often causing accidents.

The entire rolling tools should also be cleaned frequently in some form of distillate to remove mill scale and other foreign matter. This prevents flaking of the rolls, mandrel and the rolled section of the tube.

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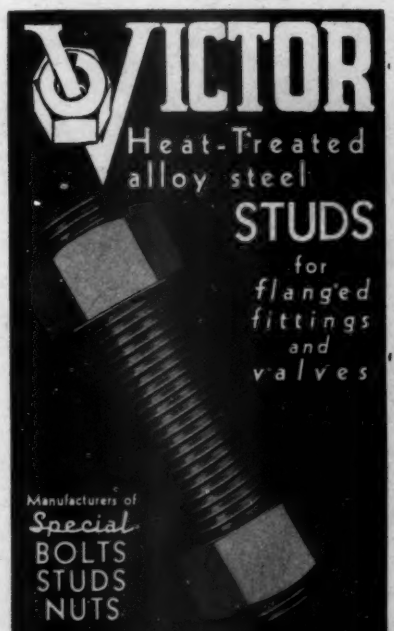

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PIPE LINES

WEP 24-In. Moves Average of 308,000 Bbl. Daily for 8 Days

For an 8-day period ending early this week, War Emergency Pipelines, Inc., pumped an average of 308,000 bbl. daily from Longview, Tex., to Norris City, Ill. Last week, shipments by tank cars from Norris City averaged about 164,000 bbl. daily; in addition approximately 35,000 bbl. daily were delivered to the Ohio Oil Co. line at Enfield, Ill. At the same time deliveries from Phoenixville, Pa., to the Philadelphia refining area averaged about 133,000 bbl. daily. In doing this storage has been drawn on at Norris City.

Testing operations are being conducted in the section immediately east of Phoenixville, where two breaks occurred recently in the 20-in. lateral to New Jersey. Oil is being pumped back to tanks at Phoenixville preparatory to pumping water from the Delaware River into the line to test at 950 lb. for 5 or 6 hours. With the exception of one small leak near Lancaster, Pa., which was quickly repaired there has been no leak or break in the entire line from Longview, Tex., to Doylestown, Pa. Oil losses from the breaks have been exaggerated and it is not believed that more than 5,000 bbl. have been lost altogether. No serious damage is reported to have been done.

More than 950 miles of 20-in. pipe of the 1,485 miles for the WEP products line has been laid. All of the 16-in. line laid by Sharman & Allen between Baytown and Beaumont, Tex., has been completed. Unusually good progress has been made by a number of the contractors. An exceptional day has been reported for Gang 2 of Williams Brothers Corp. supervised by G. E. (Doc) Burton which laid 21,600 ft. of 20-in. on August 19 near Fordyce, Ark. In the laying of the 24-in. crude-oil line, a record day was reported by Bechtel-Dempsey in the spring when 15,300 ft. were laid in Ohio. According to reports which are available a consistently high rate of progress has been maintained by Oklahoma Contracting Co., Sheehan Pipe Line Construction Co., B & M Construction Co. and J. C. Truman.

When Laura Thomas, secretary to Oscar Wolfe, chief engineer, War Emergency Pipelines, Inc., started the three 1,500-hp. motor-driven centrifugal units at the recently completed pump station on the 24-in. crude-oil line at Lebanon, Ohio, at the invitation of the operating crew, she became probably the first woman ever to place a main-line station in service

Magnolia Prepares to Loop West Texas System

MIDLAND, Tex.—Expansion of facilities to help fill the proposed 12-in. line from Midland to Corsicana, Tex., was indicated by Magnolia Pipe Line Co. when it applied for permission to loop its present line from the Slaughter pool in Cochran, Hockley and Terry counties to Midland.

The existing 8-in. line is 44 miles long and would be supplemented by two 8-in. loops, one 22 miles long extending from the Andrews station to the Seminole station and the other from the Seminole station to Slaughter. The capacity of the system would be increased from 25,000 to 37,000 bbl. per day by the looping program.

The Magnolia Pipe Line Co.'s Midland station is being improved and reconditioned. Crews are renovating tops and bottoms of four 80,000-bbl. tanks and much other work will be done before the program is completed.

Magnolia has an application before

PAW to build a 5-mile 4-in. line from the Fullerton pool in Andrews County, Texas, to the new discovery of Union Oil Co., the 1-D Biles in Section 10, Block A-31, Public School Land, Andrews County.

Stanolind Lays Gathering Line to Mueller Pool

WICHITA FALL, Tex.—The Stanolind Pipe Line Co.'s 7.85-mile 4-in. line from its station at Bowie, Montague County, to the Mueller pool in southern Montague County, Texas, is expected to be put in operation this week. The Mueller pool has two wells producing from the Bend conglomerate (Pennsylvanian) and two from the Simpson (Ordovician). The pipe-line company also proposes building a feeder line from the Ketchum pool which is between Bowie and the Mueller pool. The company has been moving oil by truck from the Mueller pool to the Bowie station.

Texas Pipe Line Considers Fort Sill-Elgin Outlet

Texas Pipe Line Co. is considering the laying of an outlet for the shallow Fort Sill-Elgin, Okla., producing area where about 340 bbl. daily are being produced. The company has been making a survey and has been studying the future possibilities of this sector of Comanche County, Oklahoma.

Oklahoma Pipe Line Enters Kentucky

Entering Kentucky for the first time, the Oklahoma Pipe Line Co., Tulsa, a subsidiary of Standard Oil Co. (New Jersey), has commenced construction of a gathering system in Union and Henderson counties to handle production from the Hitesville, Cairo, and Robards fields and deliver it to the Owensboro-Ashland Pipe Line Co. at a point near Robards, Ky. Carter Oil Co. discovered and is the principal producer in all three fields.

Active in Oklahoma, the Oklahoma Pipe Line Co. also serves the Louden field in Fayette County, Illinois, with a gathering system, connecting this pool with the Illinois Pipe Line Co.'s line at Brownstown, Ill.

Rogers & Vaughn And Cheek Merge to Form New Company

United Construction Co. has been organized, according to M. E. Conkling, business manager, to carry on the pipe-line contracting operations formerly conducted by the firms of Rogers & Vaughn Construction Co., Wichita Falls, Tex., and Cheek Construction Co., Pampa, Tex. The two concerns which have been merged in the new company maintain headquarters at Wichita Falls. F. S. Cochran is in charge of the Pampa office.

Pipe Line Construction Cycle Is Indicated

Several studies have been conducted by organizations of the industry this year to define what is referred to as the pipe-line construction cycle which follows neither the business cycle for the country nor the trends of the petroleum industry as a whole. Since there is no agency through which comprehensive data on the construction of crude-oil, product and natural-gas lines are disseminated, available records and estimates are being used for indicating broad trends which are widely recognized by men engaged in pipe-line construction.

Although the figures of the Interstate Commerce Commission do not include data on all petroleum lines they do reflect a trend which has progressed steadily from the total of 88,727 miles of line operated in 1930 to the total of 105,435 miles of such lines in 1941, with the exception of the years 1934 and 1935; operated trunk line mileage dropped from 53,405 miles in 1934 to 52,657 miles in 1935; gathering lines declined from 40,859 miles in 1933 to 39,665 miles in 1934 and 39,380 miles in 1935. During these years pipe was being removed from the ground on a larger scale by several organizations than it was being laid.

Estimates made on the basis of pipeline construction work for petroleum and natural-gas systems reported in The Oil and Gas Journal have been conservative. While they necessarily do not include all lines laid, they reflect a trend. When the estimates were made, mileage was believed to be fairly evenly divided between the petroleum and natural-gas classifications: 1937, 2,000 miles; 1938, 2,500 miles; 1939, 5,000 miles; 1940, 6,000 miles.

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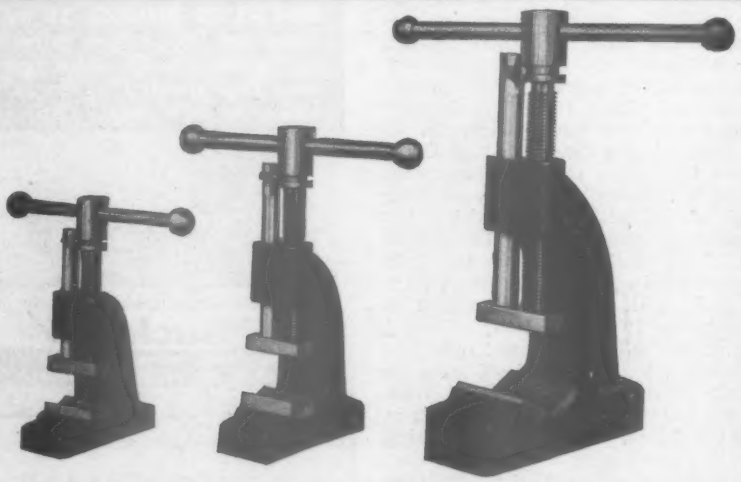

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TAPES · RULES · PRECISION TOOLS

Natural Gas

United Authorized to Buy Willmut Gas & Oil Line

WASHINGTON, D. C.—United Gas Pipe Line Co., Shreveport, La., has been authorized to acquire from the Willmut Gas & Oil Co., Hattiesburg, Miss., an 84-mile line extending from the Jackson gas field to Forrest County, Mississippi, and to construct and operate 4.4 miles of line connecting the newly acquired system with the purchaser's interstate transmission line. Willmut will retain its local distribution system and purchase gas from United.

The cost of the proposed rearrangement of the northern interconnection of the Willmut line with the Jackson-Mobile line is estimated at $35,078, and the cost of constructing the tie-over connection at the southern end of the Willmut line is estimated at $60,725. United proposes to make these expenditures from current cash funds. The War Production Board has issued a preference rating order granting permission to purchase needed materials.

A.G.A. Will Hold Silver Anniversary Meeting

The twenty-fifth annual meeting of the American Gas Association, which will be held at St. Louis, Mo., October 11-13, will have as its theme means of more effectively serving the nation at war. It will consider additional ways in which the industry can encourage the constructive use of its product to conserve fuel, to supply war industry and to support essential civilian morale.

Commemorating the silver anniversary of the founding of the association, a special ceremony is tentatively planned for the St. Louis meeting.

Awards for distinguished service to the gas industry will be a highlight of the meeting. These include the Charles A. Munroe award, the Beal medal, the A.G.A. meritorious service medal, the McCall awards, and the million-man-hour awards for accident prevention.

A meeting of the natural-gas section will be held Monday morning, October 11. Meetings of the accounting, industrial and commercial gas, residential, and technical sections will take place on Monday afternoon and Tuesday morning. Also a number of committees will conserve time and travel by taking advantage of the presence of the delegates to attend committee meetings.

Under the direction of Burt R. Bay, chairman of the natural-gas section and president of Northern Natural Gas Co., Omaha, Neb., a program of timely interest and value is rapidly taking shape. Representatives of industry and government will speak on the most urgent problems and a new slate of officers will be elected. A special feature of this meeting will be the presentation of honorary memberships to pioneer natural-gas men.

Hugoton Line Location Debated Before FPC

KANSAS CITY, Mo.—Location of the proposed Hugoton gas pipe line was still a moot subject late last week as the Federal Power Commission continued its hearing here. The Oklahoma Corporation Commission said the state favored the location as proposed in the Cities Service Gas Co. application for a permit to construct the line. At the hearing on August 27, the Kansas Corporation Commission asked that the FPC direct the construction of the line in that state where it was claimed the pipe line's load center was located.

In his testimony before the FPC, Dan Howard, geologist for the Oklahoma commission, declared that "in a few years Oklahoma will have to depend on the Hugoton field for its gas."

Wayne E. Limbocker, chief engineer of the Kansas commission, testified on crossexamination that he believed "it would take all the gas in the Hugoton field to repressure all the oil pools in Oklahoma."

Previous testimony at the hearing brought out the fact Kansas City will not get as large proportion of the gas that will be added to the proposed line as other points on the Cities Service system. The shortage on peak days is estimated as 17½ per cent for the entire system, while it will be 20 per cent in Kansas City, according to testimony of witnesses.

Mayor E. C. Moriarty, of Wichita, Kans., testified that as the major section of the Hugoton gas field is in Kansas, the pipe line should be built in that state. He pointed out that the new line could connect with the transmission system at Wichita, which due to rapid expansion of population as a war production center, needs more gas.

C.N.G.A. DIRECTORS HOLD ANNUAL MEETING

Standing: Randal Maass, General Petroleum Corp., chairman fall meeting committee; M. L. Arnold, Richfield Oil Corp.; John C. Herron, Shell Oil Co., Inc.; W. L. Rifenberick, Industrial Engineers, Inc.; J. B. Taylor, Signal Oil & Gas Co.; D. A. Cushman, O. C. Field Gasoline Corp.; R. S. Tulin, Shell Oil Co., Inc.; J. C. Gilbert, Barnsdall Oil Co.; J. A. Campbell, J. A. Campbell Co.; W. A. Kirk, California Southern Oil Co.; H. W. Parmelee, Del Valle Gasoline Co.; R. C. Wheeler, General Petroleum Corp.; I. B. Funk, Cowan Oil & Refining Co.; O. C. Field, O. C. Field Gasoline Corp.; Harold Saueressig, Southern California Gas Co., chairman program committee; R. R. Crippen, Texas Co., chairman technical committee; W. C. Dayhuff, Standard Oil Co. of California; George L. Tyler, secretary C.N.G.A. Seated, rear row: L. W. Wilbern, Daniel Orifice Fitting Co., chairman membership committee; L. V. Cassaday, Lomita Gasoline Co.; G. C. McLaren, director and chairman finance and budget committee; Warren Kraft, Honolulu Oil Corp.; H. A. Dresser, Fluor Corp., chairman entertainment committee; Harold Linbolt, Richfield Oil Corp.; R. D. Gibbs, director and chairman gas-report committee. Seated, front row: P. S. Magruder, General Petroleum Corp.; R. W. Heath, Signal Oil & Gas Co., president C.N.G.A.; C. D. Gard, Union Oil Co., vice president C.N.G.A., and John Rogers, Cooper-Bessemer Corp.

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FOSTER

Exploration and Drilling

Week's Highlights

THE financial writers are almost unanimous in pointing out that investment in oil is an excellent hedge against inflation. After the last war there was inflation followed by a sharp deflation against which neither oil nor any other commodity was a hedge. The news of recent weeks contains much evidence that oil operators are thinking of much more than a brief inflationary period after the war. They are dealing in an industry whose trend will be upward whether there is inflation or not.

Developments in refining which are now providing the armed forces with the products they need are sufficiently flexible to give the civilian the products for which he will pay high prices. And after a prolonged period of restricted driving, it will be impossible to keep him off the road. He will demand the gasoline and the refiner will bend every effort to give it to him. Moreover, experience shows that the automobile driver will not be deterred by high prices.

On the other hand, faced with a great demand for his products, the refiner will pay high prices for his raw material, particularly if there is a shortage of that material. That there will probably be a shortage is indicated by the fact that the surplus supply of crude now available will be entirely utilized in 4 months if demand continues to rise as it has done. It is true that this increase in demand is for military purposes but it is also based on an average of about half the normal civilian consumption per car. Military demand will not drop off completely after the war and civilian demand will probably more than double.

It is undoubtedly true that after the war there will be more prospecting than at any time in the history of the industry but, no matter how successful that prospecting is, the chances are that it will not prevent the upward trend of prices. Outside of another East Texas field getting out of control, it is difficult to imagine any new field which will add such a flood of oil as to depress prices. One is apt to think of Cushing and other old fields which did have such an effect and to forget the great increase in demand which would make another Cushing almost imperceptible.

It is unlikely that imports will serve to depress the price of crude, at least for some years. The European fields and those in the Netherlands East Indies will not be back on full production for some time and the demand for oil from Europe will probably absorb the augmented capacity of South American and Near East fields. The accelerated industrialization of Asia will add to the world demand and nobody expects Russia to throw much oil on the world's markets.

The possessor of crude, or of potential oil lands may have hard sledding now, but his postwar chances appear excellent. This explains the widespread purchases of oil properties by the larger companies, the most active wildcatting campaign in many years in the Rocky Mountain states, the drilling of second, third or even lower-rate prospects now going on in many districts. It also explains the redoubled interest in shale oil, the synthesis of oil from coal and the development of the tar sands.

These substitutes for oil are all very interesting but they are not likely to become major factors for many years. For one thing, a basic price of $1.50 a barrel is the level at which the most optimistic look for the appearance of oil from the most favorably located and the richest shale deposits. Obviously, few people will invest large sums in such an industry until this floor is passed by a sufficient margin to ensure the safety of their investment.

COMPLETIONS IN ALL FIELDS . . .

(Week ended August 28, 1943)

	Oil	Gas	Dry	Total	Footage	Total comp. to date 1943	1942
N. Y., Penna., W. Va.	52	20	5	77	155,716	2,214	2,273
Ohio	6	4	10	20	49,621	567	717
Indiana	1	0	6	7	12,250	147	215
Kentucky	6	6	5	17	40,141	258	136
Illinois	21	0	15	36	94,332	1,130	1,102
Michigan	5	3	7	15	35,925	389	459
Kansas	15	1	21	37	116,120	1,054	1,016
Nebraska	0	0	0	0	0	20	25
Missouri-Iowa	0	0	0	0	0	10	10
Oklahoma	12	1	23	36	118,574	759	784
Texas:							
North Central Texas	6	0	12	18	54,236	901	740
West Texas	8	0	2	10	47,193	546	977
Texas Panhandle	3	0	0	3	11,864	119	249
Eastern Texas	3	0	5	8	45,865	186	267
Texas Gulf Coast	3	0	6	9	57,052	288	499
Southwest Texas	5	0	7	12	56,788	580	748
Total Texas	28	0	32	60	272,798	2,620	3,480
North Louisiana	2	3	2	7	29,011	206	309
Louisiana Gulf Coast	3	0	4	7	65,995	240	339
Total Louisiana	5	3	6	14	95,006	446	648
Arkansas	3	0	4	7	27,879	161	111
Mississippi and Southeast	0	0	1	1	5,562	58	36
Montana	2	0	1	3	6,319	139	127
Wyoming	4	0	1	5	27,779	86	65
Colorado, Utah	0	0	0	0	0	18	11
New Mexico	11	0	2	13	47,840	144	157
California	23	1	7	31	99,578	856	484
Total United States	194	39	146	379	1,205,438	11,054	11,886
Total previous week	227	30	130	387			
Week ending Aug. 29, 1942	175	43	106	324			

ROCKY MOUNTAIN

Exploration Activity Shows Steady Increase

DENVER, Colo.—There are at present 47 wildcats drilling in 26 counties in the Rocky Mountain area, of which 10 are located in 8 counties in Colorado, 18 in 11 counties in Wyoming, and 19 in 7 counties in Montana. These are exclusive of several minor operations which have been under way for a long time, exploratory wells completed during the month, and a limited number of wells being drilled out from recent discoveries. While these are impressive figures as compared with recent past years, they do not tell the entire story of the activity in the area. It became apparent last fall that a big play was in the making in the Rocky Mountain states, but on account of the approach of winter, much of the scouting, leasing and preliminary planning did not get under way until spring. The result is that the full effect of the activity in the area is still in the near future.

A recent check shows that at least 40 geophysical crews are at present in the field in the three states. Their number is limited by the shortage of experienced men, and would be greatly increased were the crews available. Their work, generally, is not confined to any specific area, but as soon as they finish in one district they move on into another, and as a result the territory is being combed for prospective structures on a scale not heretofore approached. In most instances the surveys cover areas where blocks already have been optioned or leased up on the basis of past or preliminary geology, and will be ready for drilling when final approval is given. While a number of prospective blocks are expected to be discarded in the sifting processes, the percentage of those which ultimately will be drilled probably will run rather high on account of wildcatters being willing to take greater risks than in ordinary times.

A sign indicative of the trend is the number of offerings of leases on federal and Indian lands. As a result these leases are put up for sale when prospective bidders make requests of the governing authorities. The most notable recent example was the offering of three parcels of federal land comprising 262 acres in the Elk Basin field which brought aggregate high bids of $1,407,500. Other sales which have taken place in the past few weeks or are scheduled to be held at an early date include parcels at Buffalo Basin, Sheldon dome, Winkelman, Dry Creek, East Lance Creek, Lost Soldier, Boone, Cisco (Utah), Walker dome (Northwest New Mexico), and Tribal leases south of the Cut Bank field. These do not include several sales occurring early in the current year, nor offerings of leases on state-owned lands, there being considerable activity in the latter.

Wildcats at present drilling are widely scattered, the largest number for any county being seven in Toole County, Montana, around the Kevin-Sunburst field, with Pondera County being second with six operations under way. In Colorado, six of the 10 wildcats drilling are in Rio Blanco, Moffat, Routt and Garfield counties, on the western slope of the Continental Divide. The Wyoming wildcats are more scattered, the largest numbers being three in Hot Springs and three in Park counties, on the rim of the Big Horn basin.

High well at Elk Basin.—Continental Oil Co. 101 E-T Elk-2, NE SE NE 24-58n-100w, top well on Elk Basin structure, is a near completion in the Tensleep, and is coring in saturated sand at 4,107 ft. The elevation is 4,583 ft., and top of Tensleep was at 3,938 ft., 645 ft. above sea level. Mule Creek Oil Co. (formerly carried as Yale Oil Corp.) 1 Watson, NE NE SE 36-58n-100w, the outpost producer on the southwest, had the top of the Tensleep at 5,377 ft., or 962 ft. below sea level, an interval of 1,607 ft. in the elevation of the Tensleep in the two wells.

Deep test for Wagonhound. — The Wagonhound structure on the rim of the Big Horn basin, 4 miles northwest of the Hamilton dome field, in Hot Springs County, Wyoming, which has been passed up by wildcatters for 13 years after having one test to the Embar, is to be drilled by Broderick & Gordon in their 1 Christensen, CNL NE SE 6-44n-98w. The location offsets a well drilled in 1929-30 by the old Midwest Refining Co., which was abandoned at 4,520 ft., while still in the Embar, on account of lost tools which could not be recovered. It had the top of the Chugwater red beds at 2,885 ft. and had a show of free oil at 3,060-90 ft., had the top of the Embar at 3,695 ft., with a third show of oil at 3,730 ft., followed by sulfur water at 4,330 ft. The Tensleep and older formations have not been tested.

Pipe-line rumors. — The latest rumors regarding prospective pipe-line outlets for the Big Horn basin fields come from Washington where it is stated that inquiries are being made concerning the availability of materials and priorities for two projected lines from the Elk Basin field, one running north to Billings (40 air miles), and the other southeast (450 miles) to Salt Creek. Confirmation is lacking. The latter has been reported for many months and was credited to Stanolind Pipe Line Co., the purpose being to make a connection with its trunk line from Salt Creek to Freeman, Mo.

Water in Madison at Frannie.—Continental Oil Co. 6 Northern Pacific-1, NE SE SE 23-58-98, Frannie field, a test to the Madison, had water in that section at 3,405 ft., total depth, and is plugging back to the base of the Tensleep to complete. It tested the Madison at 3,380-3,405 ft. Location is ¼ mile northwest of Kirk 5-M Government, which made 840 bbl. initial in the Madison. Both wells are north of the two faults which traverse the structure.

Show in Madison at Pendroy.—Jarvis, Taylor 1 Goggin, a test to the Devonian in the Pendroy district, Teton County, Montana, C NE SE 7-27n-5w, which showed 150 ft. of oil and 50 ft. of rotary mud in a drill-stem test in the top of the Madison at 2,542-51 ft., will continue on to the original objective upon arrival of new 3-in. drill pipe.

WYOMING WILDCAT COMPLETIONS

Bunker Hill, Carbon County: Superior Oil Co. 1 Brimmer, CWL NW NE 32-27n-89w, tested through the Tensleep, dry at 9,392 ft.

DAILY AVERAGE PRODUCTION FOR WEEK

	Aug. 28 crude oils	Aug. PAW quota all oils*	Aug. 14 crude oil
Arkansas	76,365	75,500	76,225
California	770,450	830,000	780,450
Colorado	7,050	7,000	7,400
Eastern fields	98,750	111,500	101,500
Illinois	210,000	222,800	211,350
Indiana	13,350	14,000	13,000
Kansas	297,600	300,000	308,100
Louisiana	350,425	356,300	351,830
North Louisiana	*81,925*	.....	*83,330*
Louisiana Gulf Coast	*268,500*	.....	*268,500*
Michigan	56,950	60,100	53,100
Mississippi	52,165	50,000	50,165
Montana	22,065	23,300	21,215
Nebraska	1,900	2,100	1,950
New Mexico	105,500	110,000	104,500
Oklahoma	326,200	347,000	329,250
Texas	1,711,250	1,817,000	1,711,250
East Texas	*371,000*	.....	*371,000*
West Texas	*258,400*	.....	*258,400*
North Central Texas	*140,400*	.....	*140,400*
East Central Texas	*129,950*	.....	*129,950*
Texas Panhandle	*98,000*	.....	*98,000*
Texas Gulf Coast	*624,900*	.....	*624,900*
Southwest Texas	*88,600*	.....	*88,600*
Wyoming	102,100	98,000	103,000
Total United States	4,202,120	4,424,600	4,234,285

Total production Jan. 1-Aug. 28, 1943 ..... 954,675,805 bbl.
Same period last year ..... 908,345,895 bbl.
*Includes 245,000 bbl. daily average of natural gasoline and associated products.

PERMIAN BASIN

Andrews County Discovery Ready For Test

MIDLAND, Tex.—It was planned to take potential test on the new discovery in northern Andrews County, Union Oil Co. 1 Biles, following a two-stage acid treatment and preliminary tests. After acidizing the second time, the well flowed 26 bbl. per hour of clean oil and had an increase in gas. The test is located 4¾ miles northwest of the Fullerton pool. It is producing from the same pay as the Fullerton pool.

Northeast of the Fullerton pool, C. U. Bay 1 Bitler & Lowe, Section 12, Block A-32, Public School Land, set intermediate casing at 2,925 ft. The test is 1¼ miles away from the Fullerton pool and was reported to be lower on the base of the salt than wells in that field but higher than a wildcat drilled to the east.

The Slaughter pool expansion to the north was encouraged when the Texas Pacific Coal & Oil 5 Rains County, 580 ft. from north and west lines, Labor 5, League 42, Rains County School Land, flowed 980 bbl. from pay at 4,880 ft. and total depth 4,914 ft.

Amerada Petroleum Corp. was plugging back on its 6 Robertson, which was drilled to 9,312 ft. on the east side of the Seminole field in Gaines County.

In Borden County, W. S. Guthrie and Cosden Petroleum 1 Etta M. Conrad, NW Section 79, Block 20, Lavaca Navigation Survey, an old well drilling deeper, reported shows in broken lime at 4,146-49 ft. and 4,068-73 ft. The test is 3½ miles north of the discovery of the Vincent pool, Howard County.

WEST TEXAS WILDCAT COMPLETIONS

Hockley County: Woodley Petroleum 1 J. H. Howard, 660 ft. from N and E lines, Sec. 65, Blk. A, A. R. Thompson Sur., 5 mi. S of Anton, elev. 3,452 ft., dry, T.D. 6,204 ft., top anhydrite 1,990 ft., brown lime 3,385 ft., San Andres 3,650 ft., solid lime 3,660 ft., and San Angelo 5,030 ft.

Hopkins County: I. A. Grelling 1 W. Blalock, 330 ft. from S and W lines, 40-ac., J. G. Procello Sur., 1,680 ft. from W and 1,300 ft. from S of Sur., 2 mi. NW of Reilly Springs, elev. 520 ft., dry, T.D. 6,376 ft., top Pecan Gap 2,370 ft., Austin chalk 3,875 ft., Eagleford 4,020 ft., Georgetown 5,298 ft., and Goodland 6,253-6,323 ft.

Bowie County: Permac Oil & Gas 1 E. A. Tedwell et al, 3,200 ft. from E and 7,350 ft. from S line of John W. Weaver Sur., 3 mi. N of Bassett, elev. 303 ft., dry, T.D. 4,225 ft., top Georgetown 3,430 ft., Goodland 4,050-85 ft., and Paluxy sand 4,095-4,129 ft.

SOUTHEAST NEW MEXICO

HOBBS, N. M.—A new pool 3½ miles south of the Maljamar pool was opened last week by Maljamar Oil Co. 2-X Chessman, NE NE 22-18s-32e, Lea County. The well made 75 bbl. of 33° gravity oil from two pay streaks at 4,771-90 ft. and 4,630-76 ft.

The other discovery of the week had to be shot and acidized heavily. It was the Robert McKee 2 State, SE SE 3-19s-29e, Eddy County, which pumped 21 bbl. after being shot with 340 qt. and acidized with 8,000 gal. at 2,575-3,690 ft.

SOUTHEAST NEW MEXICO WILDCAT COMPLETIONS

Lea County: Culbertson & Irwin 1 State, SW SE 17-21s-32e, dry, T.D. 3,535 ft.

Maljamar Oil 2-X Chessman, NE NE 22-18s-32e, 3½ mi. S of Maljamar pool, initial production 75 bbl., 33° gravity, pay 4,771-90 ft., shot 90 qt. and 4,630-76 ft., shot 180 qt., P.B. 4,795 ft., T.D. 4,840 ft., top anhydrite 1,110 ft., salt 1,370 ft., Yates 2,678 ft. Discovery.

Eddy County: Robert McKee 2 State, SE SE 3-19s-29e, pay 2,575-90 ft., shot 340 qt., acid 8,000 gal., pumped 21 bbl., T.D. 3,600 ft. Discovery.

TEXAS PANHANDLE WILDCAT COMPLETION

Wheeler County: Phillips Petroleum 1 Dunker, elev. 2,336 ft., dry, T.D. 2,190 ft.

EASTERN TEXAS

Smackover Showing Found In Kaufman County

DALLAS, Tex.—Sun Oil Co. 1 Rutledge, 475 ft. from northeast, 2,376 ft. from southeast lines of Parsons Survey, northeast Kaufman County, encountered top of Smackover lime at 10,042 ft., and coring to 10,057 ft. showed good stains and oil saturation. The operators are running 5½-in. pipe before making a test. The showing in this well, one of many Smackover lime wells drilled in the East Texas district this year, all of which have been disappointing, may cause a general drilling and leasing play along the Balcones fault zone. It will be remembered that after the discovery of Talco in 1936, blocks all along the fault line were assembled and drilled, in search of further Paluxy sand production, and even though few operators are able to drill wells to this depth, it may be assumed that should the Sun Oil Co. strike prove to be the opener of a Smackover lime pool, the same kind of a wild scramble for leases and drilling blocks will occur again.

One of the largest gas wells on record seems to have been discovered in the Carthage area of Panola County. It is Smith & Turner 2 Bird, George Gillaspy Survey, which has been drilled deeper from 4,974 to 6,150 ft., with 5½-in. casing set at 6,125 ft., which has been perforated with 165 shots from 5,710-50 ft., in Pettit lime topped at 5,710 ft., showing 2,700 lb. rock pressure, and flowing an estimated gas volume of 100,000,000 to 380,000,000 cu. ft. of gas per day.

Failure for the Fairfield area of Freestone seemed a certainty when R. L. Wheelock 1 F. E. Hill, Hugh Shepard Survey, was shut down for orders at total depth 4,500 ft. The test topped the Woodbine at 4,133 ft., with porous sand from 4,181-91 ft., but no shows were recorded.

Hunt County.—Standlind 1 Bickley was shut down at 4,930 ft., topping dry Woodbine at 3,560 ft., Georgetown lime at 4,455 ft.

N. CENTRAL TEXAS

Bend Conglomerate Shows Oil North of Scotland

WICHITA FALLS, Tex.—A Bend conglomerate pool in Archer County was forecast when S. D. Johnson 1 Coleman, Coleman subdivision, Brazos County School Land, flowed 75 bbl. in 3 hours through open tubing and then died. The wildcat is 2 miles north of Scotland. The conglomerate pay at 5,697-5,716 ft. was shot with 25 qt. and flowed before gas broke through. Casing pressure at start of flow was 415 lb. and dropped to 75 lb. After being shut in overnight, the well flowed a small head and then died. It was shut in for a pressure buildup.

Bend conglomerate production extension in the Hildreth pool, Montague County, was indicated when the Continental Oil Co. 1 Gadberry, Block 55, E.T. Survey, flowed for 45 minutes on a drill-stem test from saturated conglomerate at 6,115-50 ft. The test is 1 mile east of the pool and will be drilled deeper to test the Simpson (Ordovician) before it is completed. The field produces from both pays, the Bend (Pennsylvanian) and the Simpson. Continental Oil was also under way on the southwest outpost to Bend production, the 2 Clisbee, Block 57, E.T. Survey.

Preparations to test the Mississippi lime pay was under way on the British-American Oil Producing Co. 1 Carpenter, E. W. Sergeant Survey, northeastern Young County, when the Ellenburger was found dry. Ellenburger was topped at 5,410 ft. and drilled to 5,450 ft. The Mississippian pay was topped at 5,218 ft. and drilled to 5,223 ft. A 30-minute drill-stem test at that point showed 65 ft. of oil-cut mud and a bottom-hole pressure of 1,500 lb. per sq. in. in 15 minutes.

Paradise Oil Co. was completing a well in a new pay 1½ miles southwest of Electra, Wichita County. The test, E-2 W. T. Waggoner estate, Section 1, T.C.R.R. Survey, Abstract 652, had the Shanor sand at 2,017-42 ft. and flowed 30 bbl. in 30 minutes through 2-in. tubing. The shallower pay in the pool is the Gunsight at 1,950 ft.

Largest completion yet recorded in

the Padgitt pool of Young County is the R. C. Lipscomb 1 S. L. Scott, 330 ft. from the south and west lines, Section 335, T.E.&L. Survey. The well made 1,149 bbl. through ¾-in. choke from the Mississippi lime topped at 4,696 ft. after a 500-gal. acid treatment.

NORTH TEXAS WILDCAT COMPLETIONS

Archer County: Dillard & Wood 1 A. Albright, 1,650 ft. from E line and 1,650 ft. from S line, Sec. 4, Hopper and Wade Sur., dry, T.D. 4,955 ft.

Clay County: Fortex Oil Co. 1 George S. Myers, 600 ft. from the NE and SE lines, 80 ac., Blk. 48, Bacon subd., dry, T.D. 1,165 ft.

Cooge County: T. L. Wheeler 1 Emil Vogel, 330 ft. from NE and NW lines, Sec. 1191, T. H. Conley Sur., dry, T.D. 2,003 ft.

Montague County: R. H. Dearing 1 H. D. Field, 660 ft. from NE and NW lines, Sec. 24, J. Field Sur., dry, T.D. 8,002 ft.

Wilbarger County: Jack Story, Jr., 1 W. T. Waggoner Est., 1,120 ft. from N line and 2,505 ft. from E line, Sec. 39, Blk. 4, H.&T.C. Sur., dry, T.D. 1,932 ft.

WEST CENTRAL TEXAS

ABILENE, Tex. — The Railroad Commission at Austin had before it applications to dually complete seven wells in the Wimberly pool of Jones County which already had several pays. The new pay, supposedly the Gunsight sand, is found at approximately 2,375 ft. and extends to about 100 ft. deeper. By dually completing the wells, operators get an allowable of 60 bbl. instead of the usual 30 bbl.

Wells on which applications for dual completion are pending are North American Oil Consolidated 2, 3 and 4 Mashburn; Maracaibo Oil Exploration Corp. 1 C. R. McCoy; W. D. Brookover 2 and 3 W. C. Church, and E. L. Wilson 5 R. F. Mashburn. Upper pay in the pool in the dual completions is the Hope lime approximately 50 ft. above the Gunsight. Quality of the completions is indicated by the first well so completed, the Butler & Horne Drilling Co. 5-A A. M. Wimberly, Lot 87, League 126, De Witt County School Land, which made 666 bbl. per day from the upper pay at 2,310-24 ft. after 1,000-gal. acid treatment and 1,236 bbl. from the lower pay at 2,372-2,475 ft. after 3,000 gal. acid.

WEST CENTRAL TEXAS WILDCAT COMPLETIONS

Coleman County: Hunter & Hunter 2 Griffin, 660 ft. S line and 4,620 ft. W line, Griffin tract, Hood County School Land, dry, T.D. 3,528 ft., couldn't pass tools and skidded rig to drill new hole.

Sohio Producing Co. 1 J. P. Morris, 1,890 ft. from S line and 695 ft. from W line Sec. 68, Blk. 2, G.H.&H. Ry. Sur., dry, T.D. 3,453 ft.

Comanche County: R. H. Roark 1 J. B. Hodges et al, 400 ft. from N line and 1,720 ft. from E line, S½ Sec. 3, Blk. 2, H.&T.C. Sur., 11 mi. W of DeLeon, dry, T.D. 2,915 ft.

Jones County: Hunter & Hunter 1 Bert Fields, 1,980 ft. from N and 1,980 ft. from W line, Sec. 48, Blk. 15, T.&P. Sur., dry, T.D. 5,265 ft.

TEXAS GULF COAST

Dual Completion Planned For Chesterville Discovery

HOUSTON, Tex.—Planning to effect a dual completion in the Wilcox and Cockfield sands, Magnolia Petroleum Co. was running tubing as the week closed, at 1 Anderson Brothers, 1½ miles southwest of Chesterville, where a gas and distillate producer seems to be in the making. With perforations at 9,500-40 ft. this wildcat, on a 5¼-hour drill-stem test, using ¼-in. and ⅜-in. chokes, flowed at the rate of 7½ bbl. of distillate an hour, the calculation being based on the last ¾ hour of the test. Gas volume was at the rate of 3,200,000 cu. ft. daily. Working pressure was 1,450 lb. On a 24-hour drill-stem test in the Cockfield at 6,850-60 ft., again using ¼-in. and ⅜-in. chokes, the well flowed at the rate of ½ bbl. of distillate an hour. Working pressure was 1,250 lb. A new wildcat location in Colorado County is Sinclair Prairie Oil Co. 1 A. J. Thompson, 3 miles southwest of New Ulm.

Negotiations are under way looking to purchase by Pan American Production Co. of Adams Oil & Gas Co.'s one-quarter interest in oil and gas properties and leases in the Oyster Bayou, Seabreeze, and Willow Slough fields in southern Chambers County. The negotiations involve some 30,000 acres in the three fields and a reported consideration of $9,500,000. Sun Oil Co., which is not affected by the transaction, owns a three-quarters interest in the properties. The deal is expected to be closed early in September, following clearing up of details concerning titles and taxes.

TEXAS GULF COAST WILDCAT COMPLETIONS

Brazos County: Mudge Oil Co. 1 John Coppe, J. A. E. Phelps Sur., dry at 4,536 ft.

Fort Bend County: J. K. Dorrance et al 1 Pure Oil Co., F. Kaegler Sur., A-477, dry at 4,803 ft.

Harris County: Continental 1 J. S. Millenger et al, 2½ mi. NW of Aldine, dry at 7,765 ft.

Wharton County: John B. Coffee 1 C. T. Kountze, SE of Louise field, dry at 6,518 ft.

Wharton County.—W. Stewart Boyle and John Mayo were setting a production string at 1 Claude Appling, a mile west of Louise, planning to test sand at 4,085-4,118 ft. On a 6-minute drill-stem test at that level the operators recovered 200 ft. of oil, with 700 lb. working pressure. Total depth is 6,009 ft. Salt Dome Oil Corp. has staked location for 1 A. J. Menefee et al, 3 miles west of Louise.

Chambers County. — Butcher - Arthur, Inc., was drilling at 3,210 ft. in sand and shale at 1 Clive Sherman et al, 3½ miles northeast of Wallsville.

Lavaca County.—Humble Oil & Refining Co. has staked location for 1 Dee McElroy, 4 miles south of Ezzell.

LOUISIANA GULF

Rosedale Dry Hole to Be Deepened

NEW ORLEANS, La.—Revival of interest in the old Rosedale prospect in Iberville Parish, attends a report that Humble Oil & Refining Co. is planning to deepen the dry hole it drilled there in 1939 by about 500 ft. Congo Oil Co. and Amerada Petroleum Corp. also drilled wildcat tests in this area. All the holes went to about 10,000 ft. A blowout at the Amerada well, starting a fire which burned several hours before it was brought under control, was taken to indicate the likelihood of a new field being opened, but Humble's reported deepening project is the first sign of new work in about 4 years. The Humble well is 1 Iberville Land & Mortgage Co., in 74-7s-10e.

Testing continues at Danciger Oil & Refining Co. 1 Hattie Haas, prospective pool opener in the Reddell area of Evangeline Parish. With the 6-in. casing perforated at 12,041-60 ft. the operator made a 22½-hour test with packer at 12,011 ft., using ¼-in. and ⅜-in. chokes and 3,400-ft. water cushion. The well flowed the water cushion and an average of about 1 bbl. of fluid an hour, the fluid being water-while distillate with salt water from 0 to 65 per cent. Maximum working pressure was 1,600 ft. Preparations were being made to squeeze perforations and reperforate to about 12,046-56 ft. for a drill-stem test.

Tests were still under way too at Amerada's 1 Daigle, 1¼ miles northeast of Church Point, Acadia Parish, which is expected to open a new field. On a 13½-hour gage this wildcat, with perforations at 10,338-53 ft., flowed 60 bbl. of water-while distillate, using ⅛-in. choke for 6 hours and 5/32-in. choke for 7½ hours. Maximum tubing pressure was 3,500 lb. Gas volume was at the rate of 694,000 cu. ft. daily.

East Baton Rouge Parish.—A 5-minute drill-stem test was conducted with perforations at 9,562-67 ft. at Shamrock Oil Co. 1 L. B. Phillips, in the Hallett's Bluff area, using ¼-in. and ⅛-in. chokes and 1,000-ft. water cushion. When the tool was opened it blew the water cushion over the derrick and showed a small quantity of oil, with no pressure. The crew recovered 37 stands of oil and salt water. The hole was drilled and cored to 9,874 ft. in shale, where an electrical survey was run. At latest report the crew was running 5½-in. casing.

Calcasieu Parish: Union Sulphur Co. 1

GULF COAST WILDCAT COMPLETIONS

Starks & Brown, 26-11s-12w, dry at 9,607 ft.

MICHIGAN

Good Wells in Adams and Goodwell Fields

SAGINAW, Mich.—Michigan oil-production interest was on the Adams-Arenac field again last week as Smith Petroleum Co. brought in a well for initial production of more than 200 bbl. an hour daily initial was figured as 5,160 bbl. from the 2 Stone in Section 14, completed in the Dundee at 2,891 ft.

Another big well was reported by Pure Oil Co., which completed 1 J. W. Hull, Section 9 of Goodwell Township, Newaygo County, for initial potential of 1,944 bbl. a day after acidizing at 2,787 ft.

MICHIGAN WILDCAT COMPLETIONS

Mason County, Victory Township: C. M. Russell, Tr., 1 Anderson communitized, C N½ NE NW 16-19n-17w, dry at 2,884 ft.

Mecosta County, Big Rapids Township: American Production Co. 1 Gus Hamelund, SE NW SE 13-15n-10w, 726,000 cu. ft. natural gas, T.D. 1,143½ ft., P.B. from 1,150½ ft.

Osceola County, Richmond Township: Union Drilling & Producing Co. 1 Roy Schwalm, C N½ SE SE 22-17n-10w, dry in Monroe, T.D. 3,801 ft.

Van Buren County, Pine Grove Township: Howard Gruenbauer 1 Gilbert & Sudeikis, SW NW SE 4-1s-13w, dry in Traverse limestone, T.D. 1,384 ft.

SOUTHWEST TEXAS

Discoveries in Starr and Willacy Stimulate Leasing

CORPUS CHRISTI, Tex.—Lively inquiries for lease and royalty holdings have been set off by two wells, one in Starr County and the other in Willacy, at the western and eastern ends respectively of the Rio Grande Valley. The Starr County well is Continental Oil Co. 1 William Cameron, in the George W. Smith Survey, 2 miles northeast of the Rincon field, where drill-stem tests between 4,000 and 4,500 ft. are reported to have yielded promising shows. Acreage in this area is closely held, and few royalty transactions are said to have been completed although royalty base offers as high as $250 an acre are reported.

In Willacy County the lease and royalty buying started several weeks ago by Baldridge & King's wildcat, 1 Cavazos, which extended the Willamar field about 2 miles to the southwest, has apparently not yet reached its peak. Cox & Hamon, of Dallas, are reported to have made royalty purchases aggregating about $80,000 in the newly opened area. Top base is said to have been close to $200. John T. Perryman, of Fort Worth, has closed a deal embracing 9,500 acres extending some 6 miles in a southeasterly direction from a point 3 miles northwest of San Perlita.

LOWER GULF COAST WILDCAT COMPLETIONS

Bee County: R. P. Brewer, Jr., 1 J. W. Baird, 3 mi. S of Clareville, dry at 4,503 ft.

Jim Wells County: Stanolind 1 Dora Lee Blake, 6 mi. SW of Ben Bolt, dry at 6,276 ft.

SOUTH TEXAS WILDCAT COMPLETIONS

Live Oak County: Smith & Storey, Inc., 1 Booth, Hampton & Booth, 1 mi. E of Mount Lucas, dry at 4,168 ft.

CANADIAN FIELDS

Large-Scale Tar Sands Operation Planned

CHATHAM, Ont.—Oil Sands, Ltd., sponsored by L. R. Champion and associates, of Montreal, has taken over the holdings and patents of International Bitumen Co., including an extraction plant, in the tar-sand area at Bitumont on the Athabaska River. New machinery and equipment have been secured and the plant will be renovated and put in operation as soon as the equipment can be installed. The process, worked out by R. C. Fitzsimmons, who will be associated with the new company, separates the oil and asphalt from the sands. The company's holdings cover 3,800 acres. The tar-sand deposits lie on top of a synclinal formation of Devonian limestone. The sands, 80 ft. thick, outcrop on the river and the overburden a mile back is 10 ft. thick. Test holes show a tar-sand thickness of as much as 250 ft. at some points, and the potential recovery of asphaltic crude is estimated at 300,000 bbl. to the acre, or sufficient to operate a 10,000-bbl. separation plant for 50 years. The plant is intended to produce diesel and road oil and asphalt paving and roofing products. Crude oil from the plant has on analysis been given a SC 4 asphalt specification, somewhat higher than the grade used on good public highways. The sands have been used successfully for road surfacing in northern Alberta areas. An important byproduct is ichtholene, used in skin salves and ointments. With the existing experimental plant, more than 500,000 gal. of the asphaltic crude have been extracted and utilized already; and with the improved plant, and the better transportation facilities now available, operations will be materially expanded.

Athabaska.—In the Athabaska field in northern Alberta, Deca 1, LSD 1, 4-66-22w4, sponsored jointly by Davies Petroleum and East Crest Oil Co., is below 360 ft. The location, 6 miles east of Deca 2 gasser, is selected as a point where oil instead of gas is likely to be encountered in the producing horizon around 1,651 ft.

Pouce Coupe.—Indications are that the Pouce Coupe structure, in the northern Alberta foothills west of Peace River and close to the Alaska Highway, will develop an extensive gas field. Alaska Highways Oil & Gas Co. 1, LSD 16, 22-80-13w6, formerly Bonanza Royalties, was recently deepened to 2,168 ft., developing 5,500,000 cu. ft. daily. Northwest Co. 1, LSD 15, 23-80-13w6, some years ago encountered gas in six horizons, with an estimated initial flow of 10,000,000 cu. ft. daily. Guardian Oils 1, LSD 7, 7-80-12w6, recently plugged back to 4,777 ft. for a production test of oil showings, has an estimated gas flow of 20,000,000 cu. ft. Plans are being made to utilize the gas at points along the Alaska Highway.

Jumping Pound.—On the Jumping Pound structure in the foothills west of Calgary, Shell Exploration-Norman 1, LSD 5, 22-24-5w5, is in the Kootenay formation below 11,047 ft. and should get the Madison limestone within a few hundred feet. It is planned to carry this, the deepest well in Canada, to 12,000 ft. if necessary.

Herronton.—East of Turner Valley, Shell-McWilliam 1, LSD 8, 1-21-26w4, on the Herronton structure, which got the Madison limestone at 6,458 ft. with some gas entered the Banff formation around 6,750 ft. and is deepening below 6,917 ft. It will be carried down to test the Devonian limestone. The Madison limestone here was less than 300 ft. thick, in comparison with 1,130 ft. in the Devonian 1 test in Turner Valley.

APPALACHIAN FIELDS

Oriskany Topped in Wood County Wildcat

PITTSBURGH, Pa.—In Slate district, Wood County, West Virginia, United Fuel Gas Co. topped the Oriskany sand in its wildcat, 5236 F. R. Hart at 4,841 ft. and at 4,881 ft. there has been only a showing of gas. The Corniferous was topped at 4,699 ft. Their second test in this district, 5264 J. A. Goudy, is drilling out cement after casing in the Corniferous which was topped at 5,167 ft. Both are distinct wildcats to the lower Devonian.

Tucker County.—In Dry Fork district, Ohio Oil Co. is hung up with a bad fishing job at 7,744 ft. in the deep test on the Kaemmerling tract. This test is still in the upper Devonian.

Raleigh County.—During the week two additional gas completions were reported from Slab Fork and Trap

A Bell "Airacobra" making aviation history.

You may wonder what SEISMIC has had to do with the speed and firepower of a fighter plane. It's simply this. A substantial part of the oil reserves from which aviation fuel and toluene for explosives are made is being produced from structures mapped by geophysical methods during the past decade. Modest though this contribution to victory may be, it, nevertheless, is indicative of the long-range planning of the petroleum industry to prepare the nation for any eventuality. **Seismic Explorations, Incorporated. Gulf Building, Houston, Texas.**

SEISMIC

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Hill districts. This is adding to the gas potential developed but not tested in the line as no pipe-line facilities are yet available. Considerable work is listed in this and Wyoming County, the southern part of West Virginia and if successful lines will be laid to it.

CALIFORNIA

New Rio Vista Gas Pay Contains Major Reserve

LOS ANGELES, Calif. — The real importance of the recently discovered Midland zone in the Rio Vista gas field is still somewhat obscured despite the state Lands Commission's estimated reserve of from 3 to 4 trillion feet of natural gas. There is no gainsaying, however, that the Midland gas zone has tremendously increased the gas reserve at Rio Vista which is really the only major gas field in the state at the present time.

The deep zone was discovered early in August, although a formation test previous to completion had indicated that a large gas well could be anticipated, and will probably be designated as the Midland zone inasmuch as it was proved productive in 5 Midland fee, a joint test of Standard Oil Co. and Texas Co. The discovery well produced 5,853,000 cu. ft. through a ⅜-in. bean, 9,888,000 cu. ft. through a ½-in. bean and 13,337,000 cu. ft. through a ⅝-in. bean and showed a shut-in pressure of 1,965/1,940 lb. The hole was drilled to 5,360 ft. but subsequently plugged back to 5,062 ft. Production is coming from perforations at 5,035-43 ft. as the liner above this interval was blanked off to the shoe of the 7-in. which was landed at 4,880 ft.

The Rio Vista gas field, discovered by Amerada Petroleum in 1936, is located in eastern Solano County and western Sacramento County extending across the boundary between the two counties. Approximately 26,000 acres have been found productive and, while a number of operators have completed excellent flowing gas wells, the state's interest in the field is a vital one. The state, according to the state Lands Commission, owns fee title to approximately 10 per cent of the total acreage involved and receives a royalty of 50 per cent.

Rio Vista is located in the so-called delta region under and on both sides of the Sacramento River. The recently discovered Midland zone was found below the Hamilton zone east of the Rio Vista fault but has not yet been penetrated in the area west of the fault. Conservative estimates give Rio Vista a larger gas reserve than was present at Kettleman North Dome prior to the latter's discovery and for this reason it will become an important factor in the state's future economic progress. The field may also enable Southern California Gas Co. to take deliveries from additional fields in the San Joaquin Valley and move the gas southward for consumption in Southern California. At the present time, Pacific Gas & Electric Co. is moving natural gas from San Joaquin Valley fields northward to the San Francisco Bay region through its main transmission line extending northward from Buttonwillow and Kettleman Hills.

The large reserve present at Rio Vista may enable pipe-line companies to rearrange future deliveries as it is not necessary to move San Joaquin Valley gas northward when there is an ample supply available close by and a possible shortage facing Southern California. Rio Vista has been held back for a number of years and did not go on commercial production to any great extent until conversion of the Stanpac line from gas to oil in 1942. This conversion was made possible when it was found that Rio Vista was capable of producing the amount of natural gas that was previously moving northward through the Stanpac line.

Current production at Rio Vista approximates 250,000,000 cu. ft. daily but during the winter months takings are obviously higher when gas demand reaches the peak. A total of 63 wells have been completed in the Rio Vista gas field since discovery of which Standard has drilled 21, Texas 7, Amerada 26 and the remainder by other operators.

Exploring for gas. — Due to the inability to discover new oil fields, many California operators are engaged in searching for new gas accumulations. This search is prompted by two important considerations: (1) a good gas well, based on a price of 10 cents per 1,000 ft., is a commercial well, and (2) the area in which commercial gas accumulations may be expected is quite large and has only received minor consideration to date from an exploration standpoint. In addition to these favorable factors, operators are not bothered with proration, except as to waste and the ability to move production to commercial markets, and have the inherent advantage of low drilling costs and practically no lifting cost. When an oil well goes bad it necessitates a lot of work to return it to production again but when a gas well goes to water the operator only has to set a plug and fill the hole with cement. The advantages of gas production have been recognized and consequently wildcat exploration covers a wide area in areas where commercial gas accumulations may be expected.

Northern counties area. — In the Marysville Buttes gas field, Shell Oil Co., Inc., recently completed a good gas well and will proceed with additional exploitation work on a large block of leases acquired from Buttes Oilfields, Inc. This field was discovered in 1933 by Buttes and the area is one of the most interesting gas fields in the state. The gas accumulation in this field is around the edges of a volcanic plug and much credit for its discovery goes to Walter Stalder, of San Francisco, a mining engineer and geologist of long standing. Mr. Stalder retained a royalty interest in the field as well as being instrumental in the organization of the pioneer operating company.

Recent discoveries have been made in San Joaquin and Sacramento counties where commercial gas accumulations have been located near Lodi and Thornton and further development work is being carried on. No data are yet available indicating the probable extent of each field although at Lodi there may be two separate accumulations or one large field with much faulting. The most promising wildcat area at present is at the extreme eastern end of Suisun Bay where Standard Oil Co. found some very encouraging indications last year before the two wildcats were lost principally because of mechanical difficulties. Standard has started additional work and should be able this time to find the gas sand logged in the initial well. Texas is also proceeding with additional development work in the Mendota gas field of Madera County and additional wildcats are being drilled in Butte, Contra Costa, Glenn, Solano, Tulare and Yolo counties in search of commercial gas accumulations.

Most fields in the Sacramento delta region and in the area to the north are producing from formations of Eocene age and it is interesting to note that, although no commercial production of crude oil has been found in the north and central parts of the state, many of the gas wells produce a small amount of distillate or condensate. This condensate is straw colored and in some wells must be bled off at frequent intervals. Rio Vista gas tests about 1,040 B.t.u. and is about 96 per cent methane but some of the other gas fields produce a gas somewhat lower in B.t.u. values. Several of the proved gas fields in the state have not been provided with pipe-line outlets and there is a possibility that the necessary pipe-line facilities may not be provided until after the war or at least not until pipe becomes more easily obtainable.

LOS ANGELES BASIN

Los Angeles County.—Standard Oil Co. completed a small well in the Sentous zone of Miocene age in the Inglewood field, and although the sand thickness indicated a good well might be expected permeabilities were very low. The well was 1-36 Vickers west of the Inglewood fault and south of previous production. The Sentous zone, due to low porosities and permeabilities, has failed to measure up

to expectations and is one of the poorest Miocene zones in Los Angeles Basin.

Up in the northwest section of the field, where best production has been developed to date, bottom-hole pressures took a nose dive some time ago and operators have been content to reduce production and arrest the decline in pressures as far as possible.

CALIFORNIA WILDCAT OPERATIONS

Pyramid Hills wildcat district, Kings County: Pacific Oil & Gas Development Co., 2 West Slope, 20-24s-18e, abandoned as dry hole, T.D. 994 ft., Temblor of Miocene age 920 ft., Kreyenhagen, of Eocene age 922 ft., bottomed in barren gray sand 945-994 ft.

Tejon Ranch wildcat district, Kern County: Richfield 4 Tejon, 34-11n-19w, abandoned as dry hole, T.D. 5,625 ft., top Santa Margarita 2,618 ft., top Reserve sand 4,095 ft., form. test 3,168-87 ft., recovered 75 ft. mud, no oil, gas or water showings of any kind. Santa Margarita and Reserve sand are of Miocene age.

OKLAHOMA

Southeastern Noble County Has New Perry Sand Well

A NEW oil pool was opened in Noble County at Thomas H. Berry and Blackwell Oil & Gas Co. 1 Wood, NE SE NW 1-20n-1w. Producing zone is the Tonkawa, or Perry sand at 3,496-3,510 ft. The well was drilled to 3,524 ft. where a drill-stem test showed gas in 10 minutes and flowed oil and water in 50 minutes. At the last report, the well was flowing 170 bbl. of 40-gravity oil a day and 24 bbl. of water. The per cent of water showed signs of decreasing and was believed to be coming from the bottom of the hole. Gas flow was estimated at 3,000,000 cu. ft. a day. Location of the wildcat is about 3 miles southeast of the town of Perry, east of the Perry gas field and 10 miles east of the Lucien pool, the nearest oil production.

OKLAHOMA WILDCAT COMPLETIONS

Bryan County: Bert Fields 1-A Wilson, NE NW 13-5s-12e, dry, T.D. 1,200 ft.

Comanche County: John B. Hawley 1-A Stephens, NW NW NE 22-3n-10w, dry, T.D. 1,530 ft.

Hughes County: O. H. Grimes 1 Sevier, SE SE SE 8-8n-11e, 400,000 cu. ft. gas, 740 lb. R.P., sand 2,372-2,410 ft., T.D. 2,999 ft.

Lincoln County: J. E. Crosbie 1 Quinlan, SW NE SW 26-12n-3e, dry, T.D. 5,613 ft., Viola 5,424 ft., Wilcox 5,509 ft., second Wilcox 5,606 ft.

Paul R. Smith 1 Peck, NW NW SW 5-16n-3e, dry, T.D. 4,885 ft., Hunton 4,570 ft., Viola 4,693 ft., Wilcox 4,782 ft., second Wilcox 4,809 ft.

Logan County: Eason et al 1 Cather, NE NW NW 15-16n-2w, dry, T.D. 5,817 ft., in second Wilcox, Hunton 5,403 ft., Viola 5,524 ft., Wilcox 5,702 ft.

Jordan Pet. 1 Hatcher, SE SE SW 22-16n-1e, dry, T.D. 5,226 ft., Prue 4,630 ft., Hunton 4,986 ft., Viola 5,226 ft.

Love County: Mudge Oil 1 Tanner, NE NE SE 6-6s-2e, flowed 5 bbl., 46-gravity, sand 3,134-3,204 ft., T.D. 4,510 ft.

Noble County: T. N. Berry & Blackwell 1 Wood, NE SE NW 1-20n-1w, flowed 168 bbl., sand 3,494-96 ft., T.D. 3,525 ft.

Osage County: Northern Ordnance No. 1, SW SE SW 6-20n-12e, dry, T.D. 1,801 ft., Bartlesville 1,506 ft., Burgess 1,794 ft.

Okfuskee County: Amerada 1 Palmer, NE SE NW 34-11n-10e, dry, T.D. 4,152 ft., Hunton 3,849 ft., Viola 4,040 ft., dolomite 4,063 ft.

Pottawatomie County: Atlantic and Crosbie 1 Chilcoat, SE NW SE 10-9n-4e, pumped 57 bbl., Viola 4,508-14 ft., T.D. 4,718 ft.

Stanolind 1 Hood, NW NW NW 9-11n-2e, dry, T.D. 6,034 ft., Hunton 5,623 ft., Viola 5,800 ft., Wilcox 5,920 ft., second Wilcox 6,010 ft.

OHIO, KENTUCKY

Large Well In Clayton Pool Expands North Side

ZANESVILLE, Ohio.—The Clayton pool had another good completion this week, having an initial production of 220 bbl. The well, drilled by the Preston Oil on the Loveberry tract in Section 5, is on the north side of the pool, and opens up additional locations to the north.

Another big well gauging 6,000,000 cu. ft. was completed in the Wellington pool by H. C. Bishop, who drilled the discovery well. The well, an offset to the southeast, is on the Jarvis tract in Section 25, Spencer Township, Medina County. Six strings are running in and around this pool, which is expected to help relieve the threatened gas shortage in northern Ohio this winter.

OHIO WILDCAT COMPLETIONS

Lorain County, Elyria Township: Edson and Son 1 Carl Wright, Lot 90, Clinton, 2,456-2,466 ft., dry, T.D. 2,561 ft.

Muskingum County, Hopewell Township: Atha 1 E. M. George, Sec. 13, Clinton, 3,344-3,389 ft., dry, T.D. 3,515 ft.

Perry County, Harrison Township: New Lex 1 Jas. W. Sweeney, Sec. 25, Clinton, 3,375-3,415 ft., dry, T.D. 3,515 ft.

WESTERN KENTUCKY

HENDERSON, Ky.—Six of the nine completions in western Kentucky during the week were in Henderson County and the remaining three in Webster County. Six of the new wells were oil producers.

Cherry & Kidd's wildcat, 1 Virginia Starkey, 3 miles north of Henderson was dry at 2,540 ft.

In Webster County a near completion that opens a new productive spot is W. R. Walters and Oil Carriers, Inc., 1 Cokes-Melton, flowing and swabbing 150 bbl. per day from Waltersburg and Tar Springs sands.

Ashland Oil & Refining Co. 1 W. H. Ogden, a wildcat 4 miles south of Sebree, had found no pay as deep as the Ste. Genevieve lime which was topped at 2,862 ft., total depth 2,961 ft.

WESTERN KENTUCKY WILDCAT COMPLETIONS

Henderson County: Cherry & Kidd and Ashland O. & R. 1 Virginia Starkey.

(Continued on page 82)

KANSAS

Pennsylvania Sand Well Opens Bonaccord Pool

MUTUAL OIL CO. 1 Miller, CSL SE SW 30-14-1e, first production in Dickinson County, opened the Bonaccord pool with an initial flow of 223 bbl. a day from the Burgess sand at 2,483-2,518 ft. There has been some question as to the actual name of the sand, as there is no Burgess sand production within 100 miles, but its importance lies in the fact that it is the only Pennsylvanian production in the area. The finding of oil in this sand may open the entire Salina basin for further testing.

Two other discoveries given potentials and the names recommended were: In Rice County, Western Kansas Drilling Co. 1 Keller, discovery well of the Keller pool, in SW NE SW 3-19-9w, made daily potential of 249 bbl. of oil in conglomerate at 3,244 ft. In Reno County, Phillips 1 Manning, SW SW NW 34-25-4w, southeast of Haven, rated 2,495 bbl. in Viola lime at 4,009-4,102 ft. It opens the Hilger North pool.

KANSAS WILDCAT COMPLETIONS

Cowley County: Northern Ordnance 1 Ramey, NW SW 20-33-8e, pumped 20 bbl., Kansas City 2,422-35 ft., T.D. 3,160 ft., gravity 32, discovery of Ramey pool.

Charles Jenkins 1 Pickens, SE SE NE 20-34-7e, dry, T.D. 3,025 ft., Bartlesville 2,992 ft., Mississippi lime 2,997 ft.

Ellsworth County: Vickers Pet. 1-B Jansen, NE NE SW 36-17-8w, dry, T.D. 3,437 ft., Viola 3,323 ft., Simpson 3,373 ft., Arbuckle 3,433 ft.

Graham County: W. S. Broderick 1 Benoit, SE SE NW 24-8-22w, dry, T.D. 3,748 ft., Lansing 3,343 ft., Simpson 3,672 ft., Arbuckle 3,675 ft.

Harvey County: Atlantic 1 Randall, E½ SW NE 23-22-3w, dry, T.D. 3,860 ft., Hunton 3,558 ft., Viola 3,663 ft., Arbuckle 3,778 ft.

Leavenworth County: Charles Miller 1 Fasemeyer, NW NW NE 31-9-21e, dry, T.D. 1,424 ft., sand 1,258 ft.

McLaughlin 1 Union Central, NE NE 8-10-21e, flowed 12,000,000 cu. ft. gas, McLouth sand 1,226-66 ft., S.I.P. 485 lb., discovery of Jarbalo pool.

Marion County: Wolf Creek et al 1 Duerkson, W½ NE NE 29-19-1e, dry, T.D. 3,366 ft., Lansing 2,239 ft., Simpson 3,324 ft., Viola 3,244 ft.

McPherson County: J. H. Hershey 1 Jacobson, W½ NW SE 12-17-2w, dry, T.D. 2,832 ft., Lansing 2,195 ft., chat 2,802 ft.

Heimerich & Payne 1 Neufeld, NW NW SE 18-21-5w, dry, T.D. 4,023 ft., Lansing 2,800 ft., Arbuckle 3,973 ft.

Morton County: V. R. Wyatt et al 1 Crayer, SE SE SW 32-34-42w, dry, T.D. 3,770 ft., Herrington 2,210 ft., lost circulation and stuck pipe at 2,200 ft., shot pipe and lost hole.

Russell County: Cities Service 1 Witt, SE SW 1-14-14w, dry, T.D. 3,347 ft., Lansing 2,946 ft., Lamott 3,316 ft.

Vernon Oil & Gas 1 Billings-Shaffer, NW NW NE 18-14-13w, dry, T.D. 3,337 ft., Lansing 3,016 ft., cherty Arbuckle 3,319 ft., sand 3,323 ft., show oil 2,390 ft. and 2,725 ft.

Saline County: Ingling & Parker 1 Reiff, S½ SE SE 10-15-2w, dry, T.D. 3,664 ft., Hunton 3,213 ft., Viola 3,458 ft., Arbuckle 3,612 ft., swabbed 24 bbl. fluid an hour, 2 per cent oil.

ILLINOIS

816-bbl. Outpost Completed In 1n-10e Edwards County

CENTRALIA, Ill.—Twenty-one oil wells with a total initial production of 3,735 bbl., and 15 dry holes, comprised Illinois' record of completed work during the week in review.

The largest new well of the week was R. L. Bauman 1 Gaede, E½ NW SE 9-1n-10e, Edwards County, a "near" wildcat, which flowed 816 bbl. in 24 hours after an acid treatment in McClosky lime at 3,296-3,300 ft. Later it flowed 609 bbl. in a day and 749 bbl. in a still later 24-hour period. Total depth is 3,300 ft.

A well that started at 520 bbl. in 25½ hours, Bennett Brothers 1 Hinderliter-McVeagh, C NE NW 11-1n-14w, Wabash County, was producing from Rosiclare lime which had been acidized at 2,856-60 ft., total depth 2,922 ft. The 19 other new wells averaged 126 bbl. per well in initial output.

Gulf Refining Co. was testing a potential pool opener in Marion County, 1 Floyd, SE SE NW 25-1n-3e, which swabbed 23 bbl. in 7 hours from McClosky lime at 2,730-40 ft.

Five wildcat starts were made, including R. E. Schneider 1 E. T. Walcher, SW SW SE 16-9n-3w, Montgomery County; Gallatin & Phillips 1 V. Blakeman, SW NE NE 13-9n-14w, Clark County; W. H. Wright 1 Cora Hight, W½ NW NE 32-9n-14w, Clark County; National Associated Petroleum Co. 1 York Kibbs, NE NW NW 35-4s-7e, Hamilton County; Smokey Oil Co. 1 Delap, SE SW NE 8-7s-8e, White County.

R. B. Martin and Ashland Oil & Refining Co. 1 C. Boyd, S½ SE SW 26-2n-10e, Richland County, 3 miles west of the Parkersburg pool, had good saturation in McClosky lime at 3,252-57 ft., and looked promising.

Superior Oil Co.'s wildcat, 1 Hinterscher, NE SE NW 11-4n-8e, Clay County, 6 miles northeast of the Sailor Springs pool, got 300 ft. of clean oil and 180 ft. of oil-cut mud in a drill-stem test of McClosky lime at 3,055-3,148 ft.

ILLINOIS WILDCAT COMPLETIONS

Bond County: Bond Gas Co. 1 Wm. Ingles, NW NE SW 29-6n-3w, dry at 954 ft.

Gallatin County: Halbert & Heath 1 Benner-Gregg, C SE NW 22-7s-8e, dry at 2,957 ft.

Christian County: W. A. Wainwright 1 Bernard, SE NW SW 26-15n-2w, dry at 2,000 ft. St. Louis lime 810 ft., Devonian lime 1,926 ft.

Cumberland County: Big Chief 1 Walk, SW SW NW 8-9n-7e, dry at 2,481 ft., Glen Dean 1,971 ft., Golconda 2,021 ft., Barlow 2,089 ft., Cypress 2,102 ft., Benoist 2,293 ft., Aux Vases 2,312 ft., Ste. Genevieve 2,361 ft., McClosky 2,420-26 ft.

Jasper County: Big Chief Drilling 1 Fehrenbacher, SE SE SW 9e (corrected location), pumped 154 bbl., McClosky lime 3,109-84 ft., acidized, St. Louis lime 3,209 ft., T.D. 3,213 ft.

St. Clair County: W. P. Muller 1 Smiley, NE SE NE 32-2n-7w, dry at 1,990 ft., Trenton lime top 1,946 ft.

Wabash County: S. C. Yingling 1 W. J. Shaw, NE NE SE 7-1s-12w, flowed 207 bbl., 198 bbl., 185 bbl., and 149 bbl. on successive 24-hour tests. Cypress sand at 2,055-69 ft., shot, T.D. 2,431 ft.; location is 2½ mi. NW of Mount Carmel and 1 mi. W of Mount Carmel pool.

Wayne County: Heath & Halbert 1 Richardson, C NW SE 31-2s-5e, dry at 3,215 ft., upper Kincaid 1,930 ft., lower Kincaid 2,018 ft., upper Menard 2,250 ft., Tar Springs 2,376 ft., upper Glen Dean 2,472 ft., lower Glen Dean 2,501 ft., Barlow 2,720 ft., Cypress 2,742 ft., Benoist 2,912 ft., Cypress sand 2,939-55 ft., Renault 3,002 ft., Aux Vases 3,012 ft., Ste. Genevieve 3,045 ft., Fredonia 3,098 ft., McClosky 3,117-91 ft., in breaks.

White County: Skelly and Seaboard 1 Gillihan, SW NW NE 9-5s-9e, dry at 3,416 ft., McClosky lime 3,338-5, 3,338-41 ft., 3,368-72 ft., 3,382-88 ft.

NORTH LOUISIANA

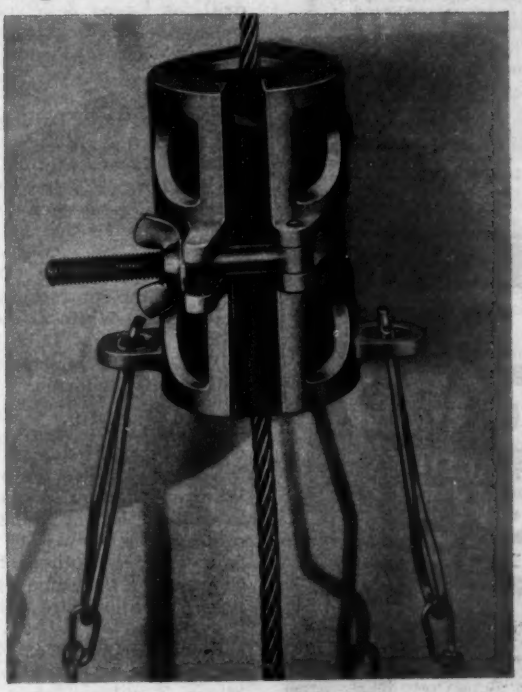
Tensas Parish Discovery Opens Holly Ridge Pool

SHREVEPORT, La.—Carter Oil Co. 1 Shelly opened the Holly Ridge pool in Tensas Parish. This was the name decided upon after the well flowed 388 bbl. of oil a day about 2 weeks ago. At present the well is shut in for pipe-line connections, having filled all available tanks. Permit for an offset has been issued and operations will get under way.

Claiborne Parish.—Frankel Broth-

(Continued on page 82)

Keeps wire lines clean



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Among the Drilling Contractors

Jack W. Frazier, Houston, Tex., was rigging up last week for 1 Cooper, a 9,500-ft. test to be drilled for Weber Ogden and associates a mile northwest of Algoa, Galveston County, Texas, in the I.&G.N. Survey.

Goldrus Drilling Co., Houston, Tex., is below 4,200 ft. at 1-W Albert Jank, a wildcat which it has contracted to drill for Lyons & Prentiss 12 miles southwest of Yorktown, in Goliad County, Texas. Projected depth is 8,000 ft.

Golding-Farris Drilling Co., Houston, Tex., was milling packer at 7,900 ft. at 1 Cavacos, 12 miles southeast of Edinburg, Hidalgo County, Texas, which it is to deepen to 9,500 ft. for Gulf States Oil Co.

Loffland Brothers Co., Houston, Tex., has the contract for drilling 1-A State Lease-White Lake, a 12,000-ft. wildcat test in Lake-14s-2w, Vermilion Parish, Louisiana, for Union Oil Co. of California.

Southern Drilling & Well Service Co., Houston, Tex., is rigging up at 1 Duncan, 3 miles south of Lissie, in Wharton County, Texas, which it is to drill for Edwin Neilson et al. This contractor is below 5,000 ft. at 1 Ragsdale, 7 miles south of Inez, Victoria County, for the same operator. Both these operations are wildcats.

Rowan Drilling Co., Houston, Tex., was rigging up last week at 1 Shirley Mixon, a wildcat which it will drill for its own account near Pearland, in Brazoria County, Texas. It was below 9,900 ft. at 1 Julia Hinz, which it is drilling for Gulf Oil Corp., on the Esperson dome, Liberty County, and it was below 4,600 ft. at 1-D State-Trinity Bay, which it is drilling for Standard Oil Co. of Texas in the South Anahuac area of Chambers County.

Parker Drilling Co., Houston, Tex., was setting surface pipe last week at 1 Robinson Land & Lumber Co. for Humble Oil & Refining Co., in 2-6n-7w, Wayne County, Mississippi. It was at 8,400 ft. at 1 J. A. Hurst, for Humble, in 33-5n-8w, Greene County. Progress on this wildcat has been slow owing to thorough coring operations. Parker was at 7,200 ft. at Atlantic Refining Co.'s 1 Frazar, in 25-3s-11w, Neale field, Beauregard Parish, Louisiana. It has completed a dry hole for Humble at 6,900 ft. in the Bear field, Beauregard Parish. This well was 1 Krause & Managan Lumber Co.

Nicklos Drilling Co., Houston, Tex., is rigging up for a wildcat test, 1 Somerset Land & Cattle Co., to be drilled for Continental Oil Co. 15 miles southwest of George West, in Live Oak County, Texas. Projected depth is 10,500 ft. Nicklos has contracted to do a workover job for Texas Co. at Texas City. Unit 38-1, in the Erath field, Vermilion Parish, Louisiana. It was drilling at 8,275 ft. at Pan American Production Co. 3 Crowell Land & Mineral Co., an 11,000-ft. test on the west side of the Pine Prairie dome, in Evangeline Parish.

Housh & Thompson Drilling Co., Houston, Tex., set surface pipe at 1,200 ft. last week for 1 Hirsch, a wildcat test which it is drilling for William Helis, 7½ miles southeast of Devers, in Liberty County, Texas. Projected depth is 8,500 ft. It was at 5,500 ft. at Humble Oil & Refining Co. 1 Alexander, in the Katy field, Harris County, and it was at 6,600 ft. at 1 Morrow, also in the Katy field, which it is drilling for John B. Hawley, Jr.

R. H. Dearing & Sons, Dallas, Tex., is the drilling contractor on a new deep test in the northeastern part of Tarrant County, Texas. This is the G. Andrade, III, 1 R. B. Sharpless, an 8,500-ft. Ellenburger, Lower Ordovician test, 6 miles west and 1 mile south of Grapevine. It was expected to spud late last week.

Jennings Drilling Co. made location for the 1 Charles Vogtsberger, a 4,900-ft. outpost to be drilled in Block 1, G.E.C.L. Survey, 6 miles south of Wichita Falls, in northern Archer County, Texas.

Taubert & McKee, contractors of Fort Worth, Tex., were rigging up on the Jesse Martin, Leo Brewster and Arthur Lee Moore 1 R. B. England, a scheduled 7,300-ft. wildcat test

in Tarrant County, Texas. The test is 9 miles west and 1¼ miles north of Grapevine. The site lies 440 ft. out of the southeast corner of the R. B. England 86.15-acre tract in the R. Baker Survey.

L. O. McMillan, Dallas, Tex., is the contractor on a Woodbine sand wildcat test to be drilled by Carter-Gragg Oil Co., in the E. Groce Survey, 11 miles north of Palestine in Anderson County, Texas. It is the 1 Jaramillo, on which operations were scheduled to get under way last week. Navarro Oil Co.; Marr, Bristol & Vaughn of Dallas; Magnolia Petroleum Co., and W. C. Feazel are reported aiding the operation.

Penrod Drilling Co., contractors on the Gulf Oil Corp. 1 Witt, in L. Rufty Survey, was making good time as it was drilling below 3,675 ft. after topping the Georgetown lime at 3,655 ft. The wildcat is scheduled to go to 12,000 ft.

C. M. Copeland and **O. D. Williams** are resigning from Helmerich & Payne, Inc., to devote their full time to their Universal Casing Pulling Co., of Tulsa. They also have acquired some tools and will engage in the drilling contracting business. **Harry Sayo,** who has been in charge of the Helmerich & Payne office in Oklahoma City, Okla., is being transferred to Tulsa to become production superintendent for the company.

W. G. Ray Drilling Co. has contract for a Cotton Valley test at D. C. Richardson's 1 J. T. Wurtzbaugh, NW SW 25-19n-11w, in the Bellvue shallow producing area of Bossier Parish, Louisiana. Contract depth is 7,000 ft. It is near a 9,000-ft. dry hole drilled to the lime by Phillips Petroleum Co. about a year ago.

J. W. Lang, Inc., is the drilling contractor on the Michigan Devonian Petroleum Co. and J. W. Lang, Inc., 2 Dozeman-Schaap, in SE NW NE 11-4n-15w, Allegan County, Michigan.

Muskegon Development Co. has been awarded contract on Gulf Refining Co. 3 T. F. Marston, in C N½ NW SE 1-14n-4e, Bay County, Michigan.

E. V. Hilliard has the contract on Ranch Oil Co. No. 4 well in SE SW SW 30-18n-4e, Clare County, Michigan. Contractor will also drill the company's No. 3 well, in SE SE NW 31-18n-4e, Clare County, Michigan.

J. C. Arthurs, Inc., is the drilling contractor on Freeman Oil Co. 1 Citizen's State Bank, in SE NW NE 31-18n-4e, Clare County, Michigan.

Smith Petroleum Co. has been awarded contract on Sun Oil Co. 1 John Zuchowski et al, in C S½ SW SE 21-15n-2e, Midland County, Michigan.

Ashby Drilling Co. has the drilling contract on Ohio Oil Co. 7 Virginia Mertz Gas Unit, in C SW 20-15n-11w, Newaygo County, Michigan. Contractor will also drill the company's 6 Gas Unit, in C NW 29-15n-11w, Newaygo County.

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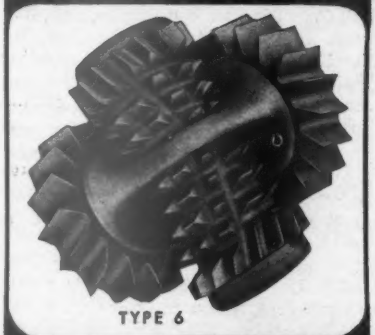

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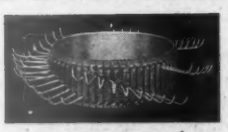

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PERSONALS

MARK L. TERRY

Broad Experience Qualifies Terry For New Duties

MARK L. TERRY, who recently was appointed assistant manager of the Rocky Mountain division of the Texas Co., with headquarters in Denver, Colo., has been with that company since 1929, and has served its interests in a number of areas.

He went to Denver from Mattoon, Ill., where he was assistant manager of the Oklahoma-Kansas-Illinois division for the past year and a half, and prior to that time he was located at Tulsa.

Before going with the Texas Co., he was assistant superintendent of production with the Josey Oil Co. When the Texas Co. acquired Josey properties in the latter part of 1929, Mr. Terry became a member of the continuing company's staff and has been with it ever since.

During the first World War he was granted a leave of absence and served with the American expeditionary forces overseas for a year. He is married and he and his family will make their permanent home in Denver.

E. L. Gross, a former mayor of Beaumont, Tex., and purchasing agent for Magnolia Petroleum Co. at Beaumont for 30 years, retired September 1.

C. A. Lupton, Fort Worth, Tex., oil man, had a varied week. In conjunction with **J. McLester** he uncovered a new oil pool in Young County, Texas. Several days later the family home in Fort Worth was burglarized, the thieves making off with over $1,000 worth of loot.

Holmes Miller, engineering department, Shell Oil Co., Inc., Centralia, Ill., has been transferred to Wichita Falls, Tex. **Jim Johnson,** district engineer's office at Wichita Falls, has gone to Centralia, Ill.

Mrs. Rosalie Reed, known to hundreds of oil men as the receptionist at the PAW office in Washington, D. C., has resigned to take a position with the Washington office of Sun Oil Co., and Houdry Process Corp.

Capt. H. T. Hunter, formerly proration engineer, Stanolind Oil & Gas Co., Fort Worth, Tex., and now in the U. S. Army, has been transferred from Camp. Roberts, Calif., to Fort Sill, Okla.

Capt. R. W. Tesch, formerly petroleum engineer with Stanolind Oil & Gas Co., Fort Worth, Tex., is back in Texas after duty in North Africa. He is a captain in the U. S. Army Engineers and is on leave pending reporting to Fort Belvoir, Virginia, for a new assignment.

Harry Aggers, Union Oil Co. of California, has been transferred to Midland, Tex., where he will become district production superintendent. The company is completing a wildcat producer in northern Andrews County, Texas. Mr. Aggers formerly was in charge of production for Union Oil in the Dominguez district and resides in Los Angeles.

Harry R. Marsh, senior engineer, Parkhill-Wade, will discuss the "Importance of Consideration of Soil Mechanics Relative to Compressor Foundations and Design," at the next meeting of the California Natural Gasoline Association, and **J. A. Shjarback,** design engineer Fluor Corp., will discuss "Practical Design of Foundations for Vertical and Horizontal Vessels in Oil Refineries."

U. D. Duncan, maintenance supervisor of Gulf Oil Corp.'s refinery in Port Arthur, Tex., has been appointed chairman of the new refinery construction committee of District 3, PAW. Mr. Duncan has been in Gulf's service 27 years, always in the construction department.

M. R. (Ted) Williams, Texon, Tex., an official of the Big Lake Oil Co., has retired after 43 years in the oil industry. From 1911 to 1923 he was in Mexico and South America, returning to this country to become assistant secretary of Big Lake Oil Co. shortly after its organization.

James S. Walp, a driller of Shell Oil Co., Inc., at Ventura, Calif., has been appointed drilling foreman for the San Joaquin division, succeeding **Walter M. Cheney,** foreman, who was recently transferred to the coastal district at Ventura.

Albert E. Pierce has been named by the board of directors of Mid-Continent Petroleum Corp., Tulsa, as general manager of production, succeeding the late George O. Moody. Formerly district superintendent in the Greater Seminole field, Mr. Pierce came to Tulsa in July 1942 to become assistant to Mr. Moody and superintendent of the southern Oklahoma production activities. He has been with the company since 1920. He is a graduate of University of Missouri, and is an active member of the Tulsa Engineers Club and the American Petroleum Institute.

Lt. Col. J. D. Hunnicutt, land man for Shell Oil Co., Inc., in San Antonio, Tex., when he entered military service in November 1940, has been transferred from the antiaircraft school at Camp Davis, North Carolina, to Camp Haan, California.

Harold G. Tigh, for some time superintendent of Texas Co.'s Oakland, Calif., terminal, has been promoted to assistant to division manager, refining department, with offices in Los Angeles, Calif.

George Hamman, vice president of Herton Oil Co., Houston, Tex., was elected president of Union National Bank in that city last week, succeeding the late R. M. Farrar. He had been vice president. Mr. Hamman, identified with oil, sulfur and banking for many years, was one of the

founders of Freeport Sulphur Co. He served as treasurer of the Houston Chamber of Commerce. His father, William H. Hamman, drilled what is said to have been the first well for oil in Texas, at Saratoga, Hardin County, and the property is still in the family's possession.

Hobart L. Howard, independent oil operator, and his son, **Hobart L., Jr.,** formerly employed in the comptroller's department by Texas Co., are

HOWARD SR.

HOWARD JR.

both in naval service now, and a few days ago, on leave at the same time, they had their first visit together at their home in Houston, Tex., since their enlistment. The father, a Marine in the first world war, engaged in wildcatting and still has interests in the Cayuga field, East Texas, and other areas. He enlisted in the Seabees in September 1942. Two months later he was assigned to oversea duty in the Atlantic area where, serving as a chief petty officer, he suffered an injury that sent him to a naval base hospital, from which he obtained convalescent leave. The son, University of Houston student, joined the Navy in November 1942, was assigned to duty in the Pacific last March, and was advanced to petty officer third class.

Charles T. Miers, who was tool pusher for Humble Oil & Refining Co. in the Maurbro district, Jackson County, Texas, has been promoted to assistant district superintendent.

Thomas F. Harwood, who worked as driller's helper for Gulf Oil Corp. in the South Texas area, has been promoted from corporal to staff sergeant at the Army air base, Great Falls, Mont. Sergeant Harwood was a student at the University of Texas.

Mary C. Mallon, Washington, D. C. attorney for the National Petroleum Association, Western Petroleum Refiners Association and other oil-trade groups, will be married at Washington in December to **Joseph W. Barker,** special assistant to the secretary of the Navy for training and personnel. Dr. Barker is on leave from duties as dean of the faculty of engineering, Columbia University.

Paul Weaver, chief geophysicist of Gulf Oil Corp., Houston, Tex., spoke from personal experience on "Japan's Northern Neighbors" at Bellaire, Tex., last week. Mr. Weaver did exploration work in Siberia at the beginning of World War I, living at Russian garrison posts.

R. D. Evans, superintendent of Phillips Petroleum Co.'s Okmulgee, Okla., refinery, has been appointed superintendent of the company's Borger, Tex., plant, replacing E. H. Bender, who was killed in an airplane accident late last month. Pending Mr. Evans' arrival in Borger, **G. A. Ibach,** manufacturing superintendent, is acting superintendent of the plant. **C. C. Tate,** mechanical superintendent at Borger, will succeed Mr. Evans at Okmulgee. **C. R. McCullough,** manufacturing superintendent at Okmulgee, succeeds Mr. Tate at Borger.

R. T. Eaton, assistant purchasing agent for J. S. Abercrombie Co., Houston, Tex., is at the receiving end of congratulations. His new daughter's name is Marsha Lynn. Mr. Eaton, Rice Institute graduate, played guard on the Rice basketball team and was captain in 1936.

H. F. Beardmore, Tulsa, has accepted appointment as chief engineer and manager of proration for Barnsdall Oil Co., leaving a post as production engineer for Amerada Petroleum Corp., which he has filled since 1938. After graduating from the University of Oklahoma in 1925 with a degree of B.S. in geological engineering, he worked in the Ranger field for Jake Hamon. He joined Indian Territory Illuminating Oil Co. in 1926 as gas engineer and was made petroleum engineer at Oklahoma City in 1929. He held that post until joining Amerada in 1935 as production engineer in the Seminole field.

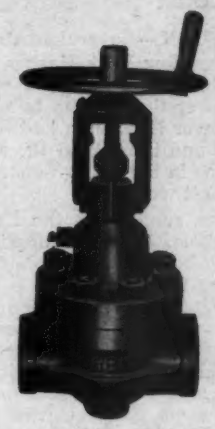
George W. Holbrook, Wellsville, N. Y., has been elected president of the New York State Oil Producers' Association. Other officers are **Leon MacDonnell** and **Charles Chapman,** Bolivar, N. Y., vice presidents, and **Bayard C. Haskins,** Wellsville, N. Y., secretary-treasurer.

James E. Buckley, superintendent of the land department of Sun Oil Co. for Oklahoma and Kansas, has been transferred to Texas. Most of his new activities will be in the Gulf Coast and Southwest Texas fields.

Harry W. Smith, with his wife and daughters, have returned to Petrolia, Ont., from Trinidad. Mr. Smith, who is drilling superintendent for Trinidad Leaseholds Oil Co. at Fyzabad, has been granted leave of absence.

ORBIT VALVES

ARE BUILT TO "TAKE IT"



ORBIT FLOW LINE VALVE
(Screwed End)

ORBIT FLOW LINE VALVE

A full round opening valve that operates easily under high pressures. No grease required to effect a seal. Compact in design, yet built to "take it."

YOUR ORBIT VALVES will last for the duration. Meanwhile, if you have any questions regarding their care or maintenance, write us.

OIL WELL IMPROVEMENTS CO.

Since 1912

TULSA, OKLAHOMA

Market Developments

East Coast

NEW YORK.—Several small breaks in the New York Harbor spur of the big-inch pipe line held total deliveries over that system to a considerably lower level than had been anticipated and intensified the shortage of gasoline in the eastern district during the past week.

Gasoline supplies in the East continued short. Primary suppliers appeared to have considerable material in storage but much of it is marked for export. Secondary suppliers are actually very short on supplies at the present time, and in some areas service stations are reported having difficulty in supplying requirements of essential users. Some oil-trade observers believe a new "crackdown" on nonessential users may become necessary for a while in order to protect needs of war workers and other essential users, in the larger factory centers of the northeastern states.

One difficulty is believed to have resulted from the fact that some optimistic forecasts of supplies made early in August encouraged motorists to use up their rations more speedily, and intensified service-station sales in this district, before the supply situation had been taken care of. Available reports indicate that gasoline will become more plentiful late in September, but that until that time there are little prospects of improvement.

Prices of gasoline and light fuel oil at wholesale continued firm during the past week. Heavy fuel-oil supplies were reported improving. Kerosene, which had been scarce during most of July, appears plentiful at this time.

Mid-Continent

DIVERSION of 50,000 bbl. of automotive fuel daily from supplies previously available in the Middle West may, trade observers contend, force a more realistic appraisal of the District 2 inventories and current rate of production.

Refiners this week reported that the 25 per cent reduction in the value of gasoline coupons had made no appreciable change in the volume of their shipments nor in the interest of buyers combing the market for additional supplies.

Improvement in the tank-wagon price structure is anticipated September 1 when OPA will permit advances in depressed areas up to 7/10 cent per gallon. Previously, the tank-wagon market in certain local areas, which were at depressed levels at the price-base period, were prevented from responding fully to improved marketing conditions and were forced to remain in their relative positions.

Prices are holding steady at ceiling levels on practically all products. Manufacturers are able to move slightly off-specification products under current conditions without suffering price penalties, thus eliminating the spreads that existed until a few weeks ago.

Pacific Coast

LOS ANGELES, Calif. — The introduction of Mid-Continent natural gasoline and gas oil into California, even though in small quantities, has set marketers to wondering how it can be done on a competitive basis with California refined products. It is not possible at present to set down casinghead or gas oil in southern California on a competitive basis and the present limited movement into the West is done through necessity. A considerable quantity of fuel-oil stocks on the Pacific Coast cannot meet Navy specifications without the addition of gas oil or other similar blending agent and there being very little gas oil available it was deemed necessary to bring in some small quantities to determine the feasibility of such movement. One marketer has been buying 34-36 gas oil in small quantities locally at $1.56 per barrel and would probably buy some more at the same figure if it was available. This price indicates the market on gas oil is tight but a recent check indicates that gas oil and natural gasoline has been growing tighter week by week and every indication points to the probability that both commodities will continue to show a stiffening condition.

The trend toward marketing premium grades of gasoline and elimination or at least minimizing sale of third-structure gasoline is having a tendency to lead toward higher quotations for the first grades and a lowering of prices on third-structure product. Marketers have it in their power to severely restrict sales of third structure by substituting premium grades and it remains to be seen whether all independent marketers will conform with expectations.

A.P.I. REFINERY REPORT

(Figures in thousands of barrels)
Week Ended August 21, 1943

	Dly. crude runs to stills	Stocks: Gasoline	Stocks: Residual	Stocks: Gas oil
Appalachian	177	2,028	531	1,002
Ind., Ill., Ky.	748	14,056	3,390	5,865
Okla., Kan., Mo.	324	6,093	1,697	2,142
Censored area*	2,000	30,354	15,467	15,774
Rockies	104	1,396	726	379
California	703	18,908	44,913	12,302
Total 8-21-43	4,046	72,815	66,724	37,464
Total 8-14-43	4,004	72,505	66,448	36,574
Total 8-22-42	3,731	79,125	76,096	40,899

*Reports combined on East Coast, Texas Gulf, Louisiana-Arkansas and Inland Texas at request of PAW.

CRUDE-OIL STOCKS

(Bureau of Mines Estimate)

Week ended:	Bbl. of crude*
August 21, 1943	236,486,000
August 14, 1943	236,520,000
August 22, 1942	246,307,000

*Excludes unrefinable California stocks.

Gulf Coast

HOUSTON, Tex. — Although Gulf Coast refineries are processing more crude, following the recent removal of the PAW of restrictions on runs to stills in District 3, inventories of oil products continue to shrink. Military and naval requirements for gasoline and other products have become so vast that the problem of building up stocks is increasingly difficult. Crude runs to stills during the first 15 days of August at the 11 active plants operated by members of the Gulf Coast Refiners Association averaged 87,295 bbl. daily, contrasted with 76,187 bbl. in the second half of July, a rise of 11,108 bbl.

Notwithstanding this increase, inventories of all products in tanks owned by association members fell 31,000 bbl. during the first half of August from the 3,197,398 bbl. at which they stood on the opening day of the month. The 11 plants were running at 72 per cent of their operating capacity, compared with 68.9 per cent in the second half of July, when many of them were suffering from damage inflicted by a coastal hurricane.

Gasoline of all grades in storage tanks of association members dropped from 1,744,000 bbl. at the beginning of the month to 1,646,000 bbl. on August 15, a loss of 98,000 bbl.

Kerosene experienced the most severe shrinkage of any of the oil products, inventories falling from 200,000 bbl. to 170,000 during the 2 weeks. No. 2 fuel stocks recorded a negligible change.

Bunker C fuel-oil inventories maintained their minor upward trend, those held by members of the refiners' association totaling 208,000 bbl.

Refinery Prices

(Prices as of August 31)

Quotations are f.o.b plant in cars and in cents per gallon except where otherwise noted. They are exclusive of the federal excise taxes of 1.5 cents a gallon on gasoline and 4.5 cents a gallon on lubricating oils, and do not include marine lighterage charges.

REFINERY GASOLINE

Octane (A.S.T.M.)	†80	74-76	72-74	68-70	63-66
Mid-Continent*	.....	.....	6.000	.....	5.625
Pennsylvania	.....	6.750-7.000	.....	.....	.....
Gulf Coast	6.00-6.50	.....	§5.750-6.250	§5.750-6.250	§5.250-5.750
Northeast Coast	9.80	.....	9.2	9.2	.....
California	.....	6 [illegible]	6.000-6.125	5.500-6.000	.....

*Basis Group 3 †1939 C.F.R. (research method). ‡Unleaded.

KEROSENE AND NO. 1 FUEL OIL

Gravity:	46	45	42-44	41-43	38-40
Mid-Continent*	.....	.....	4.500	4.375	.....
North Louisiana	.....	.....	.....	4.500-4.750	.....
Pennsylvania	6.250-6.625	6.125-6.250	.....	.....	.....
California	.....	.....	.....	4.500-5.500	4.250
Northeast Coast	.....	.....	.....	6.80	.....
Gulf Coast	.....	.....	.....	4.125	.....

*Basis Oklahoma Group 3

TRACTOR, DIESEL, AND BUNKER FUEL OIL

Specifications	46-48° G.	34 D.I.	48-52 D.I.	58 & above	Diesel bunkers	Residual Bunker C‖
Mid-Continent*	4.125	.....	.....	.....	.....	$0.80-1.27
California	.....	2.750-4.000	.....	.....	‡1.35-1.45	0.85-1.00
Gulf Coast	.....	.....	4.000	4.125	1.45	0.85-1.27
Northeast Coast	.....	.....	.....	6.800	2.780	1.65-2.07
North Louisiana	.....	.....	.....	.....	.....	0.80-1.27

*Basis Oklahoma Group 3. †10-14° gravity. ‡Pacific Specification 200. §Gravity range

FURNACE OIL, GAS OIL, FUEL OIL

	No. 2	No. 3	No. 5	No. 6
Mid Continent*	3.625-3.750	3.500-3.625	$0.85	$0.80
Pennsylvania (West)	5.875-6.125	5.875-6.000	†5.250-5.500	.....
Northeast Coast	6.7	6.7	1.95	1.65
California	5.5	5.5	‡1.10-1.25	‖1.10-1.15
Gulf Coast	3.875-4.0	.....	1.65	0.85

*Basis Oklahoma Group 3 †36-40 gravity fuel. ‡Pacific Specification 300 §Pacific Specification 400

NATURAL GASOLINE

Grades:	26-70	18-55
Oklahoma (Group 3)	4.375	4.650
North Texas	4.000	4.200
North Louisiana	4.125	4.350
California	4.875	5.500

LUBRICATING OILS

Bright and Steam Refined

OKLAHOMA (Group 3)—

200-210 D, 10-25	27.00
150-160 D, 0-10	23.00
120-125 D, 0-10	22.00
Steam refined:	
600 dark green (untreated)	9.00 9.50

PENNSYLVANIA—

Bright Stocks (Pennsylvania Grade No. 8 color, 140-150 at 210, 545-550 flash)

10 pour point	30.50
15 pour point	29.50
25 pour point	25.00 28.00
Steam refined:	
600	15.00 16.00
650	15.50 16.50
600 flash	16.00 17.50
650 flash	17.00 17.50

Neutral Oil

Vis at 100° F. except Pennsylvania and color N.G.A.)

OKLAHOMA (Group 3)—

0-10 pour point:

600-3	15.00
900-3	18.00
600-3	19.50
600-3	20.00

Note: Viscous neutrals, 10-25 pour, quoted 1 cent under 0-10 oils.

Neutral Oils

CALIFORNIA—

Pale oils:

200-2½-3	7.00	7.75
400-3-4	7.25	8.00
600-3-4	8.75	11.00
Red oils:		
200-4-5	7.00	7.75
400-5-6	9.00	11.00
500-900, 5-6½	9.25	11.25

GULF COAST—

Pale oils:

200-3	8.50	8.75
300-3	9.00	9.25
500-3½	9.75	10.00
750-3½	10.00	10.25
2,000-4	10.50	10.75
3,000-4	12.25	12.50

PENNSYLVANIA—

150 vis. at 70° F., 3 color, 400-405 flash:

Zero pour point	37.50
10 pour point	36.50
15 pour point	35.50
25 pour point	30.00
200 vis. at 70° F., 3 color:	
Zero pour point	39.50
10 pour point	38.50
15 pour point	37.50
25 pour point	32.00

WAX

(Cents per pound)

OKLAHOMA (Group 3)—	
124-126 (A.m.p.) w.c. scale	4.250
PENNSYLVANIA (inland refineries)—	
122-124 (A.m.p.) w.c. scale	4.250
124-126 (A.m.p.) w.c. scale	4.250
NEW YORK—	
Wax in bags fully refined:	
130-132 (A.m.p.) wax	5.250
132-135 (A.m.p.) wax	5.125
Crude scale:	
124-126 (A.m.p.) w.s.	4.250
124-126 (A.m.p.) y.s.	4.250

TANK-WAGON PRICES IN 50 CITIES

(Gasoline prices based on regular grades tax included, undivided dealer)

ATLANTIC AND NEW ENGLAND
(Socony-Vacuum Oil Co., Inc., and Atlantic Refining Co.)

	Dealer tank wagon	Com-bined tax	Kero tank wag
Baltimore, Md.	15.95	5.50	10.95
Boston, Mass.	14.90	4.50	10.10
Burlington, Vt.	16.90	5.50	10.50
Buffalo, N. Y.	16.20	5.50	10.00
Dover, Del.	16.70	5.50	11.20
Hartford, Conn.	15.68	4.50	10.00
Manchester, N. H.	17.30	5.50	12.10
Newark, N. J.	15.20	4.50	10.00
New York, N. Y.	16.10	5.50	10.10
Philadelphia, Pa.	16.20	5.50	11.00
Pittsburgh, Pa.	16.70	5.50	12.20
Portland, Me.	16.30	5.50	10.20
Providence, R. I.	15.00	4.50	9.00
Washington, D. C.	15.30	4.50	11.20
Average 14 cities	16.02	5.14	10.80

(All prices undivided dealer basis.)

CENTRAL
(Standard Oil Co. of Indiana, Standard Oil Co of Ohio, Continental Oil Co. and Texas Co.)

	Dealer tank wagon	Com-bined tax	Kero tank wag
Chicago, Ill.	13.40	4.50	10.0
Cleveland, Ohio	15.00	5.50	*9.00
Dallas, Tex.	13.00	5.50	7.00
Des Moines, Iowa	14.40	4.50	10.1
Detroit, Mich.	14.40	4.50	10.0
Fargo, N. D.	16.90	5.50	11.0
Huron, S. D.	16.30	5.50	11.0
Indianapolis, Ind.	15.20	5.50	10.1
Little Rock, Ark.	17.50	6.00	10.00
Milwaukee, Wis	16.10	5.50	10.0
Minneapolis, Minn	15.9	5.50	10.0
Omaha, Neb.	15.40	6.50	9.00
Tulsa, Okla.	16.50	7.00	8.00
Wichita, Kans.	12.70	4.50	8.3
Average 14 cities	15.19	5.57	9.04

*Includes 1-cent state tax.

SOUTHEASTERN
(Standard Oil Companies of New Jersey Kentucky, and Louisiana)

	Dealer tank wagon	Com-bined tax	Kero tank wag
Atlanta, Ga.	18.90	7.50	*11.50
Birmingham, Ala.	18.50	8.50	9.00
Charleston, S. C.	18.95	7.50	...
Charleston, W. Va.	19.25	6.50	13.20
Charlotte, N. C.	20.10	7.50	11.20
Jacksonville, Fla.	18.90	8.50	9.00
Jackson, Miss.	17.50	7.50	†9.00
Louisville, Ky.	16.50	6.50	8.00
Memphis, Tenn.	17.90	8.50	10.00
New Orleans, La.	17.75	8.50	*10.00
Norfolk, Va.	17.45	6.50	12.20
Average 11 cities	18.34	7.50	10.40

*Includes 1-cent state tax.
†Includes ½-cent state tax.

MIDWESTERN
(Continental Oil Co.)

	Dealer tank wagon	Com-bined tax	Kero tank wag
Albuquerque, N. M.	17.50	7.50	10.00
Boise, Idaho	20.10	6.50	16.50
Casper, Wyo.	17.00	5.50	12.00
Denver, Colo.	14.50	5.50	11.00
Helena, Mont.	17.00	6.50	13.00
Phoenix, Ariz.	18.50	6.50	12.50
Reno, Nev.	17.50	5.50	13.50
Salt Lake, Utah	15.50	6.50	14.00
Average 8 cities	17.58	6.25	13.00

PACIFIC COAST
(Standard Oil Co. of California)

	Dealer tank wagon	Com-bined tax	Kero tank wag
Portland, Ore.	17.00	6.50	13.00
San Francisco, Calif.	14.50	4.50	11.00
Seattle, Wash.	17.00	6.50	13.00
Average 3 cities	16.17	5.83	13.00
Average 50 cities	16.55	6.06	10.97

La.-Ark. Fields

(Continued from page 75)

ers 1 Muslow, NE NW 30-21n-7w, was being prepared for final completion after flowing 81 bbl. of oil a day through tubing choke from perforations at 4,282-92 ft. and 4,315-4,320 ft. Casing pressure was 550 lb. and gravity of the oil was 46.6, cutting 17 per cent water. This well is the discovery of a second pay, the Cotton Valley, in the Homer pool. Previously, exact levels of the pay zone were not reported.

NORTH LOUISIANA WILDCAT COMPLETIONS

Caldwell Parish: Placid Oil Co. 120 La. Central, NE SW 9-11n-3e, est. 25,000,000 cu. ft. gas, T.D. 3,961 ft. in gas rock, T.P. 1,060 lb.

Bienville Parish: C. C. Lowery 1 A. P. Madden, NE SE 3-16n-8w, dry, T.D. 3,005 ft.

Tensas Parish: Carter Oil Co. 1 Shelly, SW NE 19-11n-10e, flowed 388 bbl. through 5/32-in. choke, sand 8,399-8,410 ft., T.D. 8,444 ft., discovery of Holly Ridge pool.

ARKANSAS WILDCAT COMPLETIONS

Calhoun County: Skelly 2 Calion Lbr. Co., SE SE SE 34-15s-14w, dry, T.D. 3,510 ft., Nacatoch 2,040 ft., Cotton Valley 3,232 ft.

Ouachita County: Berry Asphalt Co. 1 E. Morgan, SE SE NW 22-15s-19w, dry, T.D. 1,558 ft., Nacatoch 1,542 ft.

Union County: L. B. Manley 1 Edwards, SW SW SW 2-19s-15w, dry, T.D. 2,314 ft.

MISSISSIPPI

JACKSON, Miss.—California Co. 1 National Gasoline Co. of Louisiana, Inc., 16 miles east of Natchez, Adams County, continues to encourage hope that it will be a producer. While a drill-stem test was being made from perforations at 10,270-76 ft. the well started blowing and fluid began coming. It was shut in 25 minutes while connections were being changed, after which it was opened into pits for 20 minutes and then turned into separator. Top pressure was 2,800 lb. The well flowed gas, wash water and some distillate. It was flowing into separator and through a 2-in. flow line into pits at the week end. It was reported the operator would allow the well to blow for several days.

Gulf Refining Co. 1 Aden Davis, 15 miles northeast of Laurel, in Wayne County, made a 55-minute drill-stem test through perforations at 6,668-74 ft., with packer set at 6,660 ft. When swab was run it found fluid 1,600 ft. from the top. After swabbing a few times the fluid rose to within 700 ft. of the top. Oil and wash water were recovered. The well started flowing at the rate of 5 or 6 bbl. of heavy oil (estimated gravity 20). At latest report the crew was running 2½-in. tubing to test.

LEGAL

U.S. DEPARTMENT OF THE INTERIOR, District Land Office, Cheyenne, Wyoming. Notice is hereby given that the lands herein described within the known geologic structure of the Boone Dome gas field, Wyoming, are offered to qualified bidders of the highest amounts offered per acre as a bonus for the privilege of leasing the land under section 17 of the leasing act, as amended by the act of August 21, 1935 (49 Stat. 674, 30 U.S.C. 226), at a sale to be held in the district land office at Cheyenne, Wyoming, at 10 o'clock a.m. on September 30, 1943, of the following parcels: Parcel No. 1, T. 35 N., R. 85 W., sec. 9, NE¼NE¼, N½NW¼, SE¼ NW¼, E½SW¼, W½SE¼, SE¼SE¼; sec. 10, SW¼NW¼, NW¼SE¼, SE¼SE¼; Parcel No. 2, T. 35 N., R. 85 W., sec. 14, W½NW¼, SW¼; sec. 15, E½NE¼, N½SW¼, SE¼SW¼, S½SE¼. Each successful bidder must deposit on the date of the sale a certified check or cash for one-fifth of the amount bid by him, and file a showing of qualifications to receive the lease as required by section 7 of Circular 1386. The remainder of the bonus bid and the annual rental at the rate of $1 per acre must be paid and a $5,000 corporate surety bond must be furnished prior to the issuance of the lease. Each parcel will be offered for sale separately. In the event one bidder is awarded both parcels, a collective bond in sufficient amount may be furnished to cover the two leases he obtains. Bids may be submitted by mail provided they are accompanied by one-fifth of the bonus bid, and a showing of qualifications of the bidder. The envelopes should be plainly marked for opening on the day and hour of the sale. The bidders are warned against violation of the provisions of section 59 of the United States Criminal Code, approved March 4, 1909, prohibiting unlawful combination or intimidation of bidders. The right is reserved to reject any and all bids at the discretion of the Secretary of the Interior. William G. Johnson, Register.

Western Kentucky

(Continued from page 74)

3 mi. N of Henderson, dry at 2,540 ft., Menard 1,563 ft., upper Glen Dean 1,808 ft., lower Glen Dean 1,828 ft., Golconda 1,934 ft., Barlow 2,068 ft., Cypress 2,093 ft., Renault 2,290 ft., Ste. Genevieve 2,404 ft., McClosky 2,443 ft., St. Louis 2,516 ft.

INDIANA

EVANSVILLE, Ind.—A lone 10-bbl. well in Spencer County, and six dry holes made up the record of a disastrous week in the field in Indiana. The failures included one in Gibson, two in Posey, two in Spencer and one in Warrick counties.

INDIANA WILDCAT COMPLETIONS

Posey County: Paul Maier and Bur-Kan Pet. 1 Aldridge, C NE NE 4-6s-14w, dry at 3,116 ft., Ste. Genevieve lime topped at 2,958 ft.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, General Land Office, District Land Office, Cheyenne, Wyoming. Notice is hereby given that the N½NW¼ sec. 14, T. 26 N., R. 90 W., 6th P.M., 80 acres, Lost Soldier oil and gas field, Wyoming, is offered to the responsible qualified bidder of the highest bonus per acre for lease under section 17 of the leasing act as amended by the act of August 21, 1935 (49 Stat. 674, 30 U. S. C. 226) at a sale to be held in the District Land Office at Cheyenne, Wyoming, at 10 a.m. on September 30, 1943. The land will be offered in a single unit. The successful bidder must deposit on the date of sale with the officer in charge of the sale a certified check or cash for one-fifth of the amount bid and the showing of qualifications to receive a lease required by section 7 of Circular 1386. The remainder of the bonus bid and the annual rental at the rate of $1 per acre must be paid and a $5,000 corporate surety bond must be furnished prior to the issuance of the lease. Bids may also be submitted by mail provided they are accompanied by one-fifth of the bonus bid and a showing of qualifications of the bidder. The envelope must be plainly marked for opening on the day and hour of the sale. Bidders are warned against violation of section 59, U. S. Criminal Code, approved March 4, 1909, prohibiting unlawful combination or intimidation of bidders. The right is reserved to reject any and all bids in the discretion of the Secretary of the Interior. William G. Johnson, Register.

CRUDE-OIL PRICES

Representative selected crude prices from all sections of the country appear below:

East Texas	$1.25
Conroe	1.43
Tepetate, Louisiana	1.18
Illinois basin	1.37
Pecos County, Texas	.98
Bradford, Pennsylvania	3.00
Van, Van Zandt County, Texas*	1.08

*No change since 5-21-41.

Gravity Schedules

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

Gravity—	Signal Hill, Calif.	Oklahoma, Kansas	Gulf Coast Texas	West Texas*
18-18.9	$0.80	....	....	....
19-19.9	.84	....	$1.06	$0.70
20-20.9	.88	$0.85	1.08	.72
21-21.9	.92	.87	1.10	.74
22-22.9	.96	.89	1.12	.76
23-23.9	1.00	.91	1.14	.78
24-24.9	1.03	.93	1.16	.80
25-25.9	1.07	.95	1.18	.82
26-26.9	1.11	.97	1.20	.84
27-27.9	1.15	.99	1.22	.86
28-28.9	1.18	1.01	1.24	.88
29-29.9	1.20	1.03	1.26	.90
30-30.9	1.23	1.05	1.28	.92
31-31.9	....	1.07	1.30	.94
32-32.9	....	1.09	1.32	.96
33-33.9	....	1.11	1.34	.98
34-34.9	....	1.13	1.36	1.00
35-35.9	....	1.15	1.38	1.02
36-36.9	....	1.17	1.40	1.04
37-37.9	....	1.19	1.42	1.06
38-38.9	....	1.21	1.44	1.08
39-39.9	....	1.23	1.46	1.10
40 and above	....	1.25	1.48	1.12

*Includes Lea County, New Mexico.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR General Land Office, District Land Office Cheyenne, Wyoming. Notice is hereby given that the lands herein described within the known geologic structure of the Buffalo Basin gas field, Wyoming, are offered to qualified bidders of the highest amounts offered per acre as a bonus for the privilege of leasing the land under section 17 of the leasing act, as amended by the act of August 21, 1935 (49 Stat. 674, 30 U. S. C. 226), at a sale to be held in the district land office at Cheyenne, Wyoming, at 10 a.m. on September 9, 1943, of the following parcels: Parcel No. 1, T. 47 N., R. 99 W., sec. 7, SW¼ NE¼, W½SE¼; sec. 18, W½E½, E½SW¼; Parcel No. 2, T. 47 N., R. 99 W., sec. 13, lots 1, 2, W½NE¼, E½NW¼, T. 47 N., R 100 W., sec. 24, E½NE¼, NW¼NE¼; Parcel No. 3, T. 47 N., R. 100 W., sec. 11, NE¼NW¼, E½SE¼, sec. 13, SW¼NW¼; Parcel No. 4, T. 48 N., R. 100 W., sec. 26, E½SW¼, sec. 27, NW¼NE¼, sec. 28, NE¼ NE¼; Parcel No. 5, T. 48 N., R. 100 W. sec. 35, lots 1, 2, NW¼NE¼; Parcel No. 6. T. 48 N., R. 99 W., sec. 31, lot 4, T. 48 N., R. 100 W., sec. 36, lot 7. Each successful bidder must deposit on the date of sale, with the officer in charge of the sale, a certified check on a solvent bank or cash for one-fifth of the amount bid by him and file the showing of qualifications to receive a lease required by section 7 of Circular 1386. The remainder of the bonus bid and the annual rental at the rate of $1 per acre must be paid and a $5,000 corporate surety bond must be furnished prior to the issuance of the lease. Each parcel will be offered for sale separately. The successful bidder of two or more parcels may consolidate them in a single lease if the total acreage does not exceed 640 acres, and may file a satisfactory collective bond. Bids may be submitted by mail provided they are accompanied by one-fifth of the bonus bid, and a showing of qualifications of the bidder. The envelope should be plainly marked for opening on the day and hour of the sale. Bidders are warned against violation of section 59, United States Criminal Code, approved March 4, 1909, prohibiting unlawful combination or intimidation of bidders. The right is reserved to reject any and all bids in the discretion of the Secretary of the Interior William G. Johnson, Register

Equipment Progress

Asbestos Cement Pressure Pipe Introduced By Ruberoid Co.

Easier and more economical installation, smooth walls which assure high carrying capacity by reducing friction to a minimum, and the elimination of electrolysis and tuberculation are among the advantages claimed for a specially fabricated form of asbestos-cement pressure pipe recently introduced by Ruberoid Co., 500 Fifth Avenue, New York, N. Y.

The new product, called "Eternit" A-C pressure pipe, is created, according to the manufacturers, by a patented extrusion process which, in addition to providing density and strength, insures uniform measurements and extremely smooth surfaces, both inside and out, without machining. For this reason, it is claimed, the pipe can, when necessary, be cut in the field with a hack saw and be coupled immediately without the machine preparation ordinarily required at such joints—an important economy in time, labor and the utilization of short lengths.

Made from an exactly controlled mixture of asbestos fiber and portland cement—both noncritical materials—the new Eternit pipe is not subject to rust. Being a nonconductor of electricity, it is unaffected by stray ground currents and may be safely laid contiguous to electric light and power lines without danger of galvanic corrosion.

Trade Literature

B. F. Goodrich Co., Akron, Ohio.—A new wall chart on "Truck and Bus Tire Loads." The chart measures 25 in. by 19 in., and it is printed in two colors.

Kerlow Steel Flooring Co., 222 Culver Avenue, Jersey City 5, N. J.—A 24-page catalog of the company's open steel flooring, grating and safety steps. The catalog is featured by large illustrations which clearly show the proportions and construction of many different designs of open steel flooring.

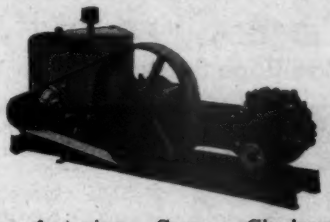
Carrier Corp., Syracuse, N. Y.—A new specification sheet describing blower-type heat diffusers, designed to heat and ventilate large areas uniformly and economically. Described in the four-page brochure are types 46 P, Q and R heat diffusers. The brochure gives heat-diffuser ratings at standard speed and industrial speeds, also B.t.u. constants based on 2 lb. steam, 60° entering air temperature.

Flori Pipe Co., St. Louis, Mo.—A 64-page illustrated book which covers the various ways in which piping can be used and lists present market prices for every conceivable kind and size of fabricated piping.

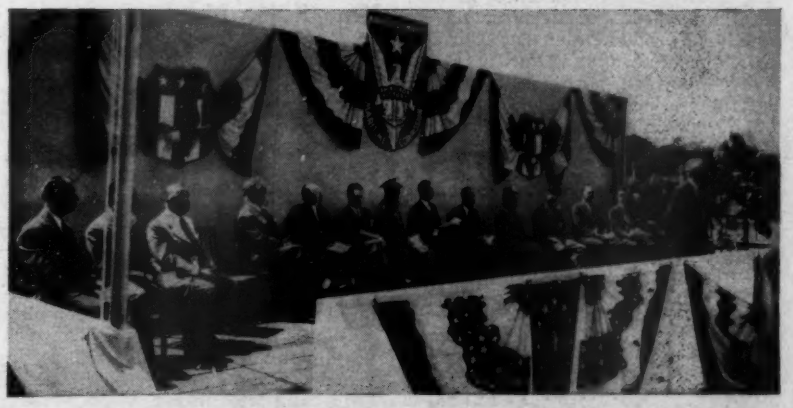
Darling Valve & Manufacturing Co., Williamsport, Pa.—A new catalog for all industries. The catalog has been in the making for 5 years, and embodies a number of special features in valve cataloging and engineering data, with special emphasis on readability and indexing for quick reference. The catalog has 324 pages, size 7¾ in. by 10¾ in.

New Design for Power Pump

The power pump illustrated is a new design manufactured by the McGowan Pump division of the Leyman Manufacturing Corp., Cincinnati, Ohio. This is a duplex side-pot power pump, designed for general use in the oil, steel, synthetic-rubber and related industries. Carefully engineered, sturdily built, outstanding features include a 1,000-lb. working pressure, all movable parts totally enclosed, herringbone gears, Timken roller bearings. It has a flanged suction connection on either side and double shaft extension. Bearing housings are



AMERICAN CHAIN & CABLE AWARDED MARITIME "M"



On July 16, during ceremonies held at Reading, Pa., the employes and management of the Reading-Pratt & Cady and Reading Steel Castings Division of American Chain & Cable Co., Inc., heard their production record praised by Col. Willard F. Rockwell when he presented the "M" pennant, Victory Fleet Flag and Labor Merit badges on behalf of the U. S. Maritime Commission.

Four representatives of the workers, Mrs. Margaret Brough, Mark L. Brown, Henry G. Zember, and Martin A. Powers, received Maritime Labor Merit badges on behalf of employes.

On behalf of the directors and stockholders, William T. Morris, president of American Chain & Cable Co., Inc., thanked the Maritime Commission for the honor bestowed on the Reading plant.

extremely large to provide easy maintenance. The power pump is easy to assemble or disassemble. Interchangeable liners give optional capacities and pressures.

General American Operates Two Government Terminals

General American Transportation Corp., owners and operators of a fleet of tank cars, announce that the Division of General American Tank Storage Terminals will operate two government-owned terminals in Florida.

These terminals which are located at Jacksonville and Panama City are not yet quite completed—nevertheless, they are already in partial operation.

An official of General American said that petroleum will be hauled from a Gulf refinery to the terminal at Panama City and then moved by tank car across the state to Jacksonville for further distribution along the Atlantic Coast.

General American Tank Storage Terminals own and operate five terminals located at Houston, Corpus Christi, Carteret, Westwego and Goodhope.

Among Equipment Men

T. H. McSheehy Heads Wire Rope Sales Division

T. H. McSHEEHY

Wickwire Spencer Steel Co. has announced the appointment of T. H. McSheehy as sales manager, wire-rope division, effective September 1.

In his new capacity, Mr. McSheehy will supervise wire-rope sales throughout the country. J. A. Old, who has been with the company a number of years, succeeds Mr. McSheehy as Pacific Coast sales manager.

Mr. McSheehy first came with Wickwire Spencer in 1923. During this time he has served in a variety of executive sales capacities, including hardware products manager, structural products manager, Chicago district manager and Pacific Coast manager, which position he held at the time of his new appointment.

Before joining Wickwire Spencer, Mr. McSheehy was with American Steel & Wire Co.

He will be located in the company's general offices, 500 Fifth Avenue, New York City.

W. D. Sloan to Maloney

W. D. Sloan, formerly with Warner & Godfrey, certified public accountants, for the past 10 years, has joined Maloney Tank Manufacturing Co., Tulsa, as comptroller. Mr. Sloan, widely known in business circles, was also for many years an instructor in higher accountancy in the night school of Oklahoma School of Business, Accountancy, Law and Finance.

Franklin Supply Co. Celebrates Removal To New Quarters

Jene Harper, president, and the officials of Franklin Supply Co., held open house on Friday, July 23, to celebrate their moving into their new headquarters offices in Suite 802, located at 600 South Michigan Avenue, Chicago.

Oil men, manufacturers and supply men attended the open house and everyone was given an opportunity to see the modern business offices which are air-conditioned and equipped with the latest and finest office equipment.

Spang-Chalfant Appoints New Sales Manager

Spang - Chalfant Division of National Supply Co. announces the appointment of R. M. Burk as manager of sales—seamless products.

Upon his graduation from Cornell University in 1922, Mr. Burk entered the oil business in the employ of Waite Phillips Co., Tulsa. In 1926 he joined National Supply Co. as division tubular manager, Los Angeles, Calif., and later in succession became manager of sales, Spang-Chalfant, Los Angeles, and manager of sales. Spang-Chalfant, St. Louis, Mo. In 1940 he returned to Los Angeles as assistant to the vice president of National Supply Co., which position he leaves for his new assignment.

Mr. Burk will assume his new duties September 1, 1943, with headquarters in the general offices of Spang-Chalfant, Grant Building, Pittsburgh, Pa.

Classified Advertising

LEASES AND DRILLING BLOCKS

FOR Drilling Blocks, and leases, and royalties in Wood, Franklin and Hopkins counties, Texas—see

W. B. WORTHEN
P. O. Box 84 Winnsboro, Texas
Phone 228

NEW 89-acre lease, ¾ mile from production, Shelby County, Texas, two other wells to start soon. $3.50 per acre. Excellent buy! Four Thousand acre drilling block on good structure. Write C. A. Parker, Box 451, Center, Texas, for information.

FOR SALE: New state oil and gas leases, Lea, Eddy and San Juan counties, New Mexico. Easy payments—free map and circulars. Wm. C. Uphoff, Box 703, Peoria, Ill.

FOR SALE: Oil lease with 4 producing wells in Viola Lime, approximately 3100' depth—in Butler County, Kansas. Write P.O. Box 13, Pittsburg, Kansas.

DRILLING BLOCK, 8,000 acres, full geology, geophysical, core drilled to gas. Oil production probable 3,000' depth. Want deal on development proposition. S. W. Pressey, Pueblo, Colo.

LEASES ROYALTIES

PRODUCING OR NONPRODUCING

Texas, New Mexico, Oklahoma,

Louisiana and Illinois.

20 Years' Experience

Inquiries Invited.

B. D BUCKLEY
60 Broadview Drive, Clayton
St. Louis, Mo.

DEALERS, Oil and Gas Leases: Get in touch with us for leases inside drilling blocks in Kentucky at once. Prices right, real oil play in the making. Dobbs Oil & Gas Co., 504 Wilson Bldg., Dallas, Texas.

CONGRESS OPENS Oil Reservation lands to lease American citizens. It's opportunity to file developing oil area. Box B-782, The Oil and Gas Journal, Tulsa, Okla.

FOR SALE: Producing oil properties in Oklahoma and Kentucky. If interested, write. Rex-Pyramid Oil Companies, J. M. Stevenson, president, Winchester, Kentucky.

NEW MEXICO
State Oil and Gas Leases

TWO DEEP TESTS UNDER WAY—one a 7,500 ft. test; the other a 6,000 ft. test. 40 acres and multiples thereof for sale in the HoT SPoT. Write for information. HARRY S. WRIGHT, New Mexico State Lessee, Farmington, New Mexico.

FOR SALE: 10 acres in Johnston, Sequoyah, Cherokee and Pittsburg counties, Oklahoma. Barry, 3505 Legation St N.W., Washington 15, D. C.

FOR SALE oil and gas lease on structure, or part furnished for drilling contracts, also proven tracts of fluorspar. W. P. Harley, Bowling Green, Ky.

GEORGIA LEASES: 8500 Acres New Five Year Leases, Ten Cent Rental, Adjoining Major Company Block. Will sell or deal for 6000 foot test. Write for details. Box B-793, The Oil and Gas Journal, Tulsa, Oklahoma.

PATENT ATTORNEYS

PATENTS, Trade-Marks, Booklet, "General Information Concerning Inventions and Patents" and "Free Schedule" sent without obligation. Established 1915. Lancaster, Allwine & Rommel, Suite 418, Bowen Bldg., Washington, D. C.

Classified Advertising

EQUIPMENT FOR SALE

FOR SALE—1—14 x 12 Gardner-Denver Twin Cylinder-Piston Valve Type Roller bearing complete enclosed oil bath—steam engine mounted on 12 x 12 H Beam steel skids with necessary cross members and braces 20 feet long with National steam separator and trap-force feed oil pump and 6" Badgett steam lubricator for dual oil system — 3" Brown throttle valve — 22 tooth dual drive split sprocket for 1240 double chain. All the above mounted in unit and completely piped and fitted for steam connection.

2—12 x 12 Oil Well Supply Twin Cylinder Steam Engines mounted—fitted and equipped as above—Approximate HP 750.

None of these engines need overhauling or repairs. They are ready to go.

1—OWS 9 x 9 x 9 Drawworks unit with hydromatic brake, double engine drive water cooled drum complete with guards and chains.

1—400 ton 8" Ideco swivel complete w/gooseneck and left hand bottom connections.

Other drilling equipment, also 3½ and 4½ O.D. Drill Pipe for sale. F. H. BROWN, P. O. Box 331, Carmi, Illinois.

FOR SALE: Oil refinery equipment including high and low pressure valves, gages also two new Caterpillar D-2 tractors equipped with La Plant Choate hydraulic Dozers. List of items sent to interested buyers on request. HARVEY BROTHERS, Parkdale, Colorado.

1—500 HP Terry condensing turbine—1750 RPM.

1—700 HP Terry condensing turbine—2900 RPM.

1—100 HP Superior twin gas engine compressor.

1—22/13 x 14 Sullivan angle 2 stage 1250' Compressor with 250 HP motor. Rebuilt. $7,000, on cars.

3—I. Rand type XPVR 1800 ft. compressors, steam driven.

4—4" Pacific 10 stage centrifugals—500 GPM-750#.

1—600" x 34' Southwestern flash column.

1—750 sq. ft. Southwestern condenser, steel shell, admiralty tubes.

1—670 sq. ft. Braun 6 pass, 250# atmospheric section.

1—40 sq. ft. G. Rusell shell and tube condenser, 800# WP.

3—14 x 12 I.R. cylinders XRB.

3—14 x 14 I.R. cylinders XRB.

DAVE WEST COMPANY
2301 East 37th St., Los Angeles, Calif.

FOR SALE: Streamline Wilson Giant Power Rig, complete with 7¼ x 18 Oil Well power pump, 27½ oil bath Union Tool rotary table, 300 HP Waukesha Motors. 122' derrick—everything latest type. Address Box 239, Abilene, Texas.

FOR SALE: Approximately 5000 feet of 4½" left-hand drill pipe; also 6" Kelly with connection for running same. This drill pipe is made up in doubles of about 45 feet. All tool joints and collars have heavy welds. Box B-789, The Oil and Gas Journal, Tulsa, Okla.

COAL STORAGE

Solve your coal storage problem with our 50-ton hopper cars and also have mobile storage. More flexible and money-saving too!

100 CARS AVAILABLE!

1683 and 1831 cu. ft. capacities and cross or side-discharge.
Other types also available.
Request our illustrated bulletin.

IRON & STEEL PRODUCTS, INC.
38 years' experience
13412 S. Brainard Ave., Chicago 33, Illinois
"ANYTHING containing IRON or STEEL"

EQUIPMENT FOR SALE

FOR SALE: 9000' or any part used 3 conductor electric cable in good condition for any service 1000 volt or less. Price 25c to 45c per ft. Free sample on request. John Irby, P.O. Box 4387, Oklahoma City, Okla

2—100 bbl. tanks $225.00, 1—Buda 180 HP Diesel skid type motor $2500.00, 1—Rotary Table with round drive, kelly, and swivel, $1250.00. Also, National machine complete with tools and accessories. Call 1312 Odessa, Texas.

UNITIZED Gasoline Powered Outfit—capacity 3500 ft., 2 strings drill pipe 3½ to 2⅞" near Holton, Kansas. $10,500 cash. Further information write owner M. J. Lewis, 1201 Bennett, Long Beach 4, Calif.

DRILLING RIGS for sale for cash; or on acceptable terms of credit.

1—Wilson Giant Diesel Rig, with two 225 HP Cummings Diesel Motors, compounded; 14 "x 7¼" x 14" Gardner-Denver pump; heavy derrick and heavy equipment entirely suitable for 5500 foot drilling; with or without drill pipe.

1—Diesel Rig, with two 225 HP Cummings Diesel Motors, compounded; 8" Emsco H-46 unitized draw works, with roller bearing drum shaft; 14" x 7½" x 14" new Gumbo Buster pump, made part of one well only; heavy duty OCS clutch; heavy derrick, and everything else about the rig suitable for drilling to 7500 feet; with or without drill pipe.

1—Steam Rig, less drill pipe, with
3—125 HP 300# WP Kewanee boilers.
2—14" x 7¼" x 18" Wilson Snyder mud pumps, unitized on same skid.
1—Unitized boiler feed pump unit, with two 10" x 4½" x 10" pumps.
1—12" x 12" Gumbo Buster roller bearing, fully enclosed engine.
1—25½" Gumbo Buster fully enclosed oil bath rotary table.
1—9" Acme Unitized Draw Works.

Other items are generally complete, but there may be a few items short. Both of the diesel rigs described above are now running and can be inspected on the job. Box B-784, The Oil and Gas Journal, Tulsa, Okla.

CASING
15,000 feet 6⅝" 22 lb. No. 1 lapweld casing.
LINE PIPE
20,000 feet 3" T & C Standard line pipe, No. 1.
Located Yale, Oklahoma
BENDER SUPPLY COMPANY
1205 Marshall Street, Shreveport, La.

SPECIALIZING IN
Used and New Machinery and Industrial Equipment. Domestic—Export
Contact us if you have any surplus equipment for sale or if you wish to purchase Industrial Equipment.
Industrial Supply & Equipment Co., Inc.
New Orleans, La., Canal Bldg.,
MAgnolia 5586
Tulsa, Okla., 310 Thompson Bldg.,
Phone 5-3296

Cross Reaction Chambers

2—60" O.D. x 44' x 4" Thickness Vessels, Hammer-Welded Construction, Fabricated by Krupp. Available for immediate delivery. Price on application.

Wire, Phone or Write

REFINERY EQUIPMENT, INC.
Tulsa 1, Okla.

EQUIPMENT FOR SALE

FOR SALE: Approximately 40,000 ft. of used 7" O.D. 24# plain end line pipe. Available for immediate shipment from Oklahoma points. Central Supply Co., 109 N Elgin, Tulsa, Okla.

DIESEL ENGINES
Large selection — All sizes and types. Generator units, marine engines, gasoline engines, auxiliaries—also boilers, steam engines, turbo generators.
Complete Information on Request
A. G. SCHOONMAKER COMPANY
45 Church Street New York, N. Y.
Phone—WOrth 2-0455

EQUIPMENT WANTED

WANTED

Several Steel Clad Buildings

30' to 60' wide
(Or wider if you have them)
and
100' to 500' long.

Please give all details, location, and price.

JOS. GREENSPON'S SON PIPE CORP.
National Stock Yards, Illinois

WANTED
Used storage tanks
Pressure Tanks:
All sizes
Send us your list
SONKEN-GALAMBA CORP.
108 N. 2nd St., Kansas City, Kansas

SMALL rotary drilling equipment complete. Good for 2500'. List everything with make and price in first letter. Box B-783, The Oil and Gas Journal, Tulsa, Okla.

WANTED to rent or buy rotary rig and all equipment to drill 5500' to 10,000'. Send particulars to Box 98, Osage, Wyoming.

WANTED: 12,000 feet of Used Plain End Line Pipe, 10¾" OD or 12¾" OD; minimum wall ¼". Box B-787, The Oil and Gas Journal, Tulsa, Okla.

WANTED
1—7" Cameron 6000# Test, Pressure Operated, Flow Line Valve.
1—10¾" Cameron 6000# Test, Pressure Operated, Master Valve.
1—7" Cameron 6000# Test, Pressure Operated, Blowout Preventer.
We are interested in new and used equipment. Do not offer used equipment unless in perfect operating condition. Quote condition and price. Danciger Oil and Refining Co., Fort Worth, Texas, LD 142, G. B Magruder, Jr.

WANTED
Used Structural Steel
Pipe — Valves
Fittings
Send us your list
SONKEN-GALAMBA CORP.
108 N. 2nd St., Kansas City, Kansas

ROYALTIES

I OFFER large production royalties in Pecos County, Texas. John Stouppas, 823 W. Broad St., Columbus, Ohio.

Journalisms:

SECOND of The Journal's staff to enter the armed services First Lt. Leonard L. Cox, former Mid-Conti-

L. L. COX

nent representative in the Advertising Department and more recently pilot of the Flying Fortress "Oklahoma Okie" brings back with him the Distinguished Service Cross and the Air Medal with three oak leaf clusters. Lieutenant Cox won his D.S.C. for coming to the aid of another fortress which had run out of ammunition, fighting off the German planes attacking it and giving the ship cover back to England. On another occasion, he spotted the crew of another fortress floating in dinghies near the German coast and stayed with them until they were rescued.

ALTHOUGH he claims his ship was lucky because on his 25 successful missions, several of them long-distance raids over Germany, none of his crew were lost, the fact that on two occasions he was forced to make one-wheel landings with one or two motors shot out suggests that the pilot may have been responsible for a considerable part of this luck. Lieutenant Cox is now on duty at Salt Lake City and The Journal hopes that he will have the same good fortune through the rest of his military career as he has had up to date.

VOLUNTEERING early in 1941 in the 125th Observation Squadron, Lieutenant Cox was called into the Army in May. After receiving his training as a pilot in the United States, he was stationed in Newfoundland where he flew for a time on the North Atlantic patrol.

IRREGULAR pour points have been observed for many years in lubricants and research chemists have made great progress in eliminating them. Among the principal causes are variations in temperature while in storage, the amount and type of pour depressant used and the effect of other additives. In an article to appear in next week's Journal, L. M. Henderson and W. G. Annable, of the Pure Oil Co., discuss the results of experiments carried on over a period of years and describe two methods of conducting pour-stability tests.

HOW a major oil company secures cores of formations by reverse circulation where conventional methods give poor, or no, recoveries, will be described in next week's issue.

CALENDAR

September

AMERICAN CHEMICAL SOCIETY petroleum division, fall meeting, September 6-10, Pittsburgh, Pa.

NATIONAL PETROLEUM ASSOCIATION, annual meeting, Waldorf Astoria Hotel, New York City, September 21-22.

October

AMERICAN ASSOCIATION OF OILWELL DRILLING CONTRACTORS, third annual meeting, Houston, Tex., October 5-6.

AMERICAN GAS ASSOCIATION twenty-fifth annual meeting, Jefferson Hotel, St. Louis, Mo., October 11-13.

MID-CONTINENT OIL AND GAS ASSOCIATION, annual meeting, Blackstone Hotel, Fort Worth, Tex., October 14-15.

INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA annual meeting, Fort Worth, Tex., October 25-27.

November

AMERICAN PETROLEUM INSTITUTE, twenty-fourth annual meeting, Palmer House, Chicago, Ill., November 8-11.

December

NINETEENTH EXPOSITION OF CHEMICAL INDUSTRIES, Madison Square Garden, New York, December 6-11.

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